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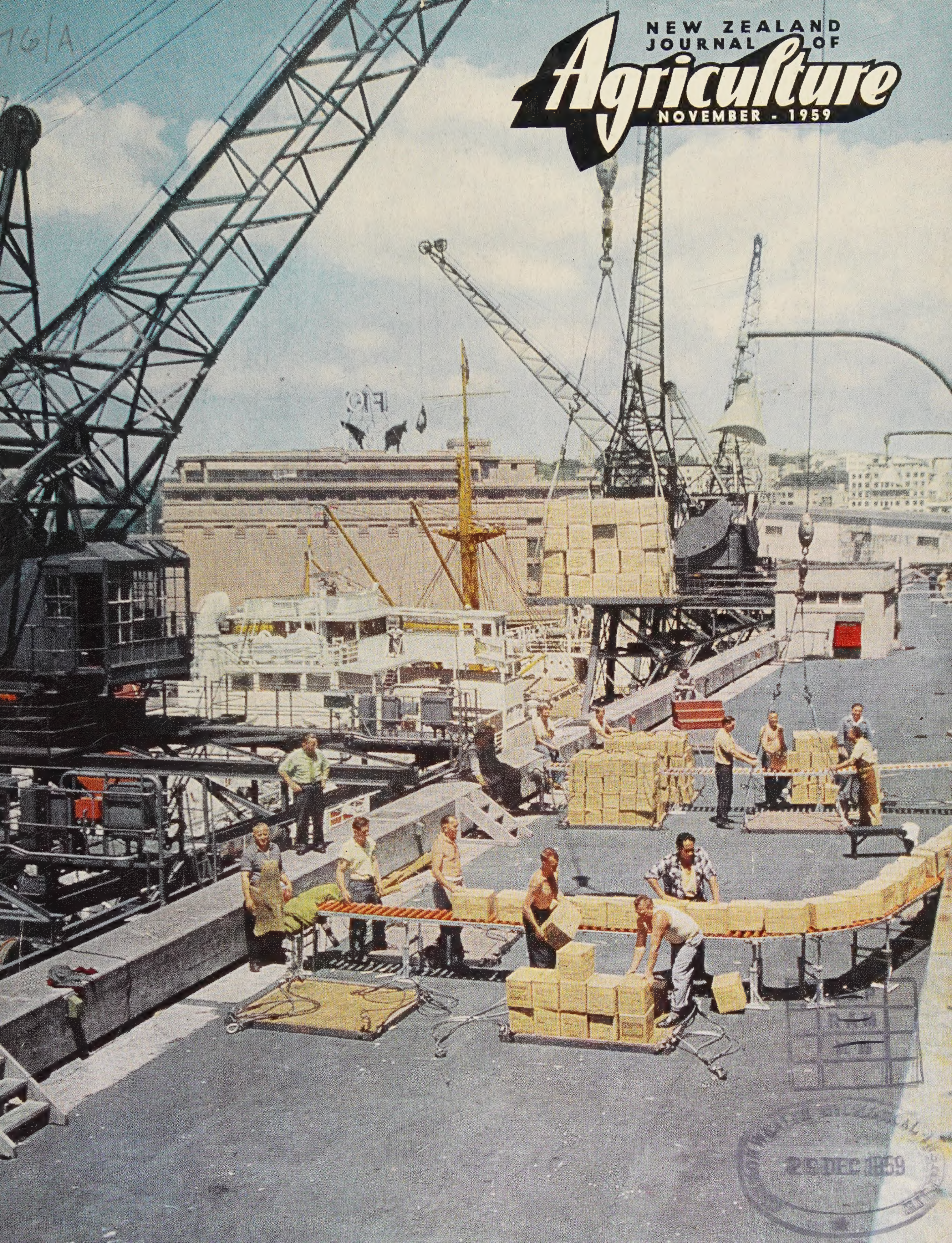

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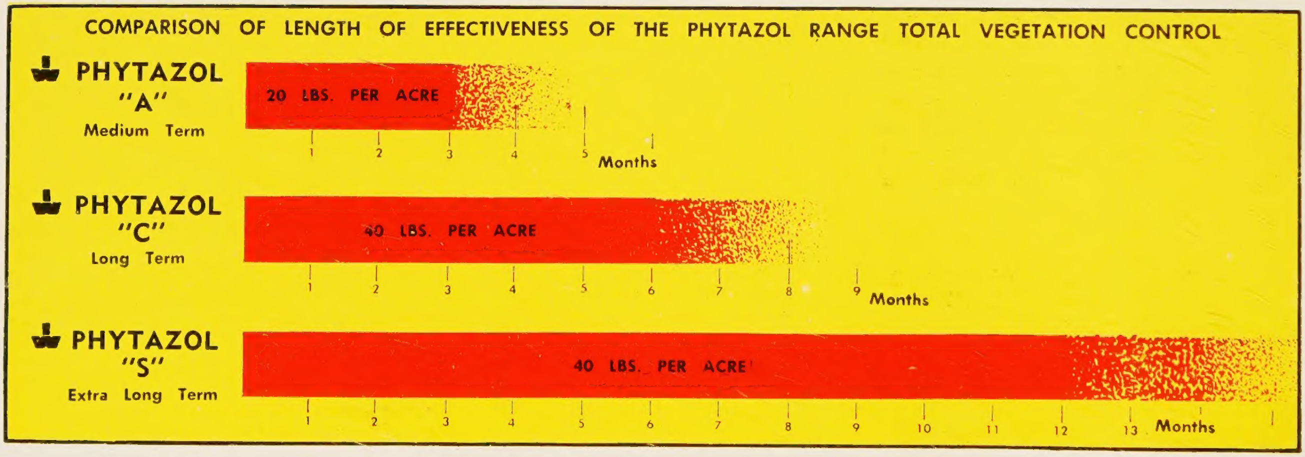

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Agriculture

[*R. V. Francis Smith photo*

Some of New Zealand's record production of butter being loaded on to an overseas vessel at Auckland during last season. New Zealand is the world's largest exporter of butter. Slings are shown being hoisted from the roof loading area of the Bledisloe Wharf, which is connected by a ramp to the cool stores in the centre background.

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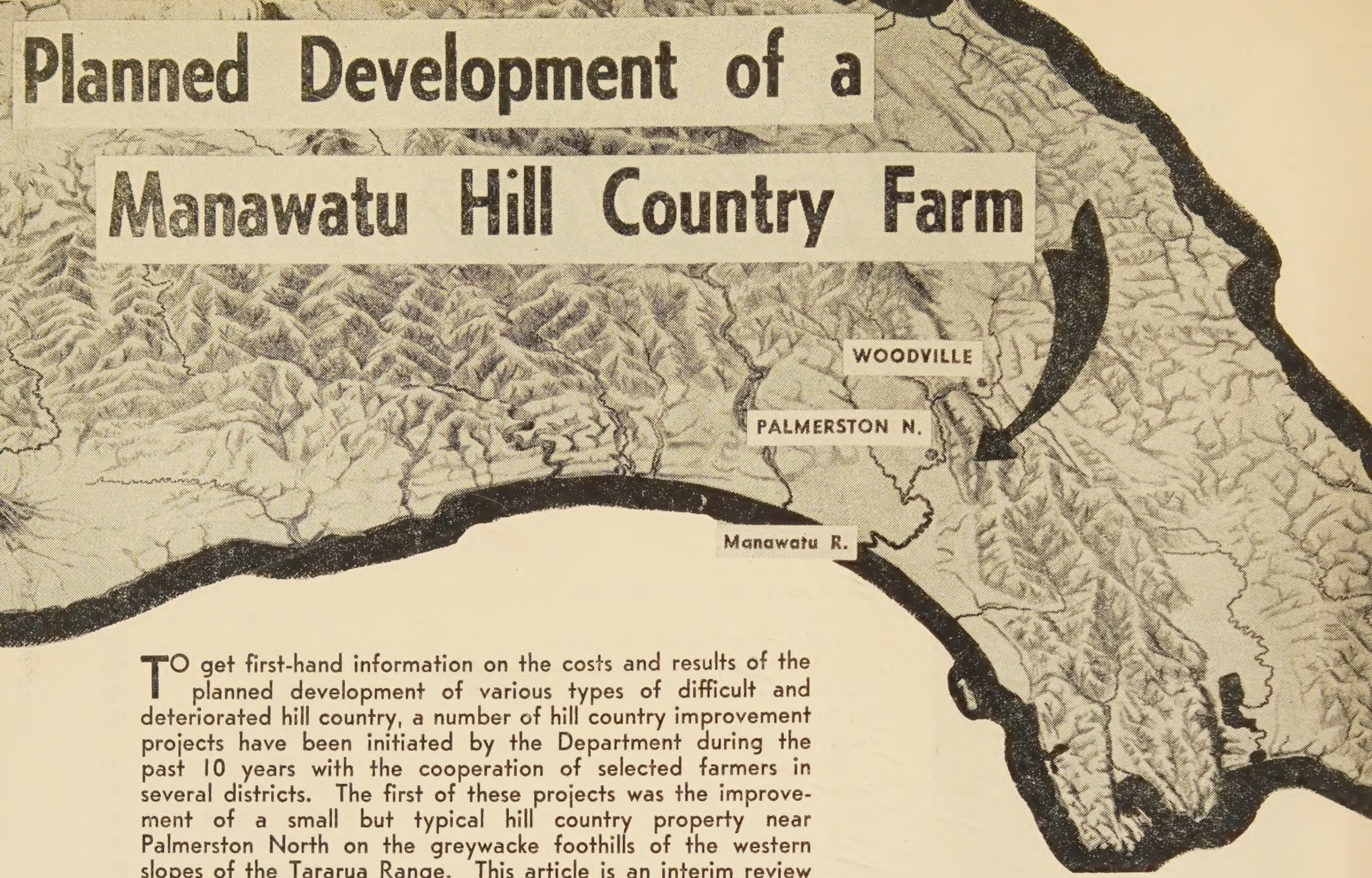
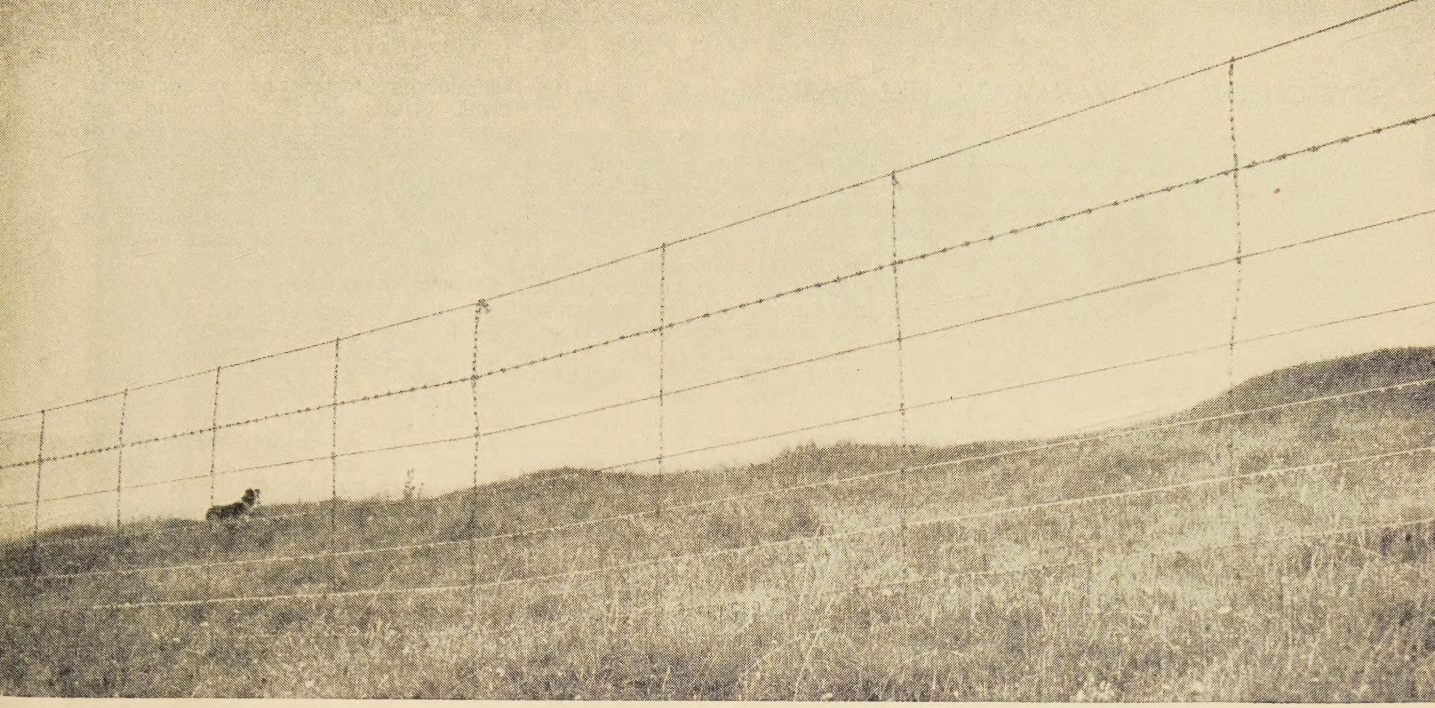
Planned Development of a Manawatu Hill Country Farm



TO get first-hand information on the costs and results of the planned development of various types of difficult and deteriorated hill country, a number of hill country improvement projects have been initiated by the Department during the past 10 years with the cooperation of selected farmers in several districts. The first of these projects was the improvement of a small but typical hill country property near Palmerston North on the greywacke foothills of the western slopes of the Tararua Range. This article is an interim review of the development programme for the first eight years, during which the carrying capacity has been doubled. Though the initial development expenditure has been completed, the full effects of the programme have not yet been realised, as the pastures continue to improve as a result of the heavier stocking and improved stock management.

By J. A. GRAHAM,
Instructor in Agriculture,
Department of Agriculture,
Palmerston North

The homestead and some of the easier hills behind it.



The Hunter-type fencing used in the development of the property has proved very satisfactory apart from some rusting of the chains due to poor galvanising.

THE property, which is freehold, is farmed by Mr W. L. Elliott and is about 8½ miles from Palmerston North near the city's water supply dam at Tiritea. It consists of 512 acres and is divided by a road into two blocks, south-west 292½ acres and north-west 219½ acres.

There is practically no scrub or gorse, but about 13½ acres is in native bush and the effective grazing area is just under 500 acres. The country is rolling to steep and is typical of thousands of acres of foothill country along both sides of the Rimutaka, Tararua, and Ruahine Ranges. Some of the flatter tops and gentler slopes could be cultivated, but owing to the numerous steep gullies and the situation of fences, there are no large areas suitable for the growing of forage crops.

The height above sea level ranges from 600 to 1,500 ft and areas with westerly and northerly aspects are very exposed to the prevailing winds. Even in summer when the weather is calm and hot on the plains conditions on the exposed tops and faces are often windy and decidedly cool. The rainfall of 45 to 50 in. per annum is fairly well spread, with frequent summer showers, but the effect of these is often nullified by the persistent drying winds. Consequently the soil, especially on the exposed faces, is frequently dry for long periods in summer and autumn.

The main soil types are Makara and Ruahine silt loams, both of which respond to phosphate, lime, and molybdenum. It is probable that on the exposed faces, where stock graze but do not camp, there is a deficiency of potash.

Property before Improvement

Before the start of the improvement programme the property was divided into six main paddocks ranging from 57 to 125 acres. Much of the internal fencing was, and some still is, in poor condition, but the boundary fences were in reasonably good order. The pastures lacked vigour and comprised mainly danthonia, browntop, and sweet vernal, with some suckling clover, but were devoid of white and subterranean clovers, except on patches of higher fertility such as stock camps and sheep tracks.

Stocking was about one ewe plus replacements per acre and 55 cattle. Though the pastures were poor, the farm was understocked, and with the paddocks as large as they were, heavy stocking per acre could not be achieved. Patch grazing was therefore inevitable, with the stock concentrating on the more fertile areas and tending to neglect the steeper faces, especially when feed was plentiful. Consequently many of the faces were generally covered with rank grass of poor feeding quality throughout most of the year.

Apart from 6 tons of superphosphate and some clover seed applied to an experimental area in 1948, no topdressing or oversowing had been done. The house, shearing shed, and sheep yards were old and, in keeping with the farm as a whole, were generally in poor condition.

Development Programme

The farm was (and still is) operated as a one-man unit and, like many other hill country farms at that time, was making little or no headway owing to lack of finance and unavailability of labour for hand topdressing. Aerial topdressing was then only in the experimental stage.

In 1948 the farmer, seeking to increase production and so improve the living standard of himself and dependants, sought advice from the local officer of the Department of Agriculture. As a result the Department initially carried out some large-scale topdressing and clover-oversowing trials on the property, but later it was decided that the whole farm should be used as a development project for demonstration purposes. In 1949 the Department entered into an agreement with the farmer and a programme of planned development began in autumn 1950. Broadly the programme was as follows:

The Department agreed to provide the seed for one oversowing and the fertiliser for two initial topdressings of the whole farm. Blocks of the farm were to be treated in sequence over six years. The initial topdressings were to be followed by maintenance dressings of one third of the farm each year by the farmer.

A scheme of mob stocking and rotational grazing was to be introduced, and to carry out the grazing management required it was decided to subdivide the property into 12 main paddocks; this was later extended to 15. The Department was to supply fencing materials and meet erection costs, such fencing to be bought later by the farmer at cost.

Stock numbers were to be increased at the rate required to make the fullest use of improvements in the pastures and this was expected to call for an average annual increase of about 80 to 90 ewes. It was estimated that the property would carry approximately 500 additional ewes plus replacements by the sixth year and ultimately the carrying capacity should improve to about 2½ ewes per acre plus replacements.

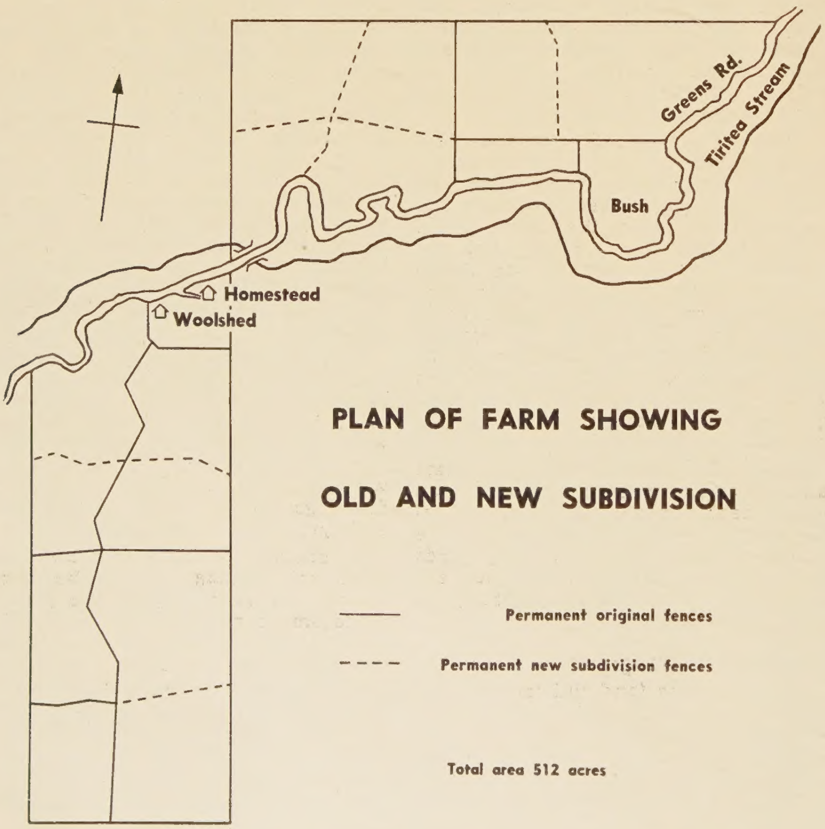
For various reasons, such as an initial lack of a handy airstrip and unavailability of labour for hand topdressing and fencing, the annual programme could not always be adhered to. Nevertheless, though progress was slow, especially in the first two or three years, the total development envisaged was completed within the stipulated time.

Topdressing and Oversowing

One hundred and sixty-one tons of phosphatic fertilisers and 20 tons of lime have been applied. Initially either straight superphosphate or serpentine superphosphate was used, but trials carried out on the farm showed that molybdenum gave worthwhile if not spectacular results and since 1954 only molybdenised superphosphate has been applied. Trials also demonstrated the value of lime applied at a low rate per acre and though the only block treated with lime improved as a result, lack of finance has so far prevented greater use of lime.

At first both subterranean and white clovers were oversown, but the results from the former did not appear to justify the expenditure and its use was discontinued after the second year of development. (It is not suggested, however, that other kinds of clovers should not be used on hill country where results warrant their inclusion.) Before 1954 all the fertilisers and clovers were hand sown, but since then the construction of a nearby airstrip and the improved financial position have permitted the use of aircraft.

Generally, the results of the oversowings with clovers were variable. On the more fertile, closely grazed areas they were satisfactory, but on the steeper faces establishment was not always good, because of rank grass growth, low fertility, and dry soil. Better results would perhaps have been achieved from early spring oversowing, as winter grazing by cattle would have removed much of the rough growth and soil moisture would have been more favourable. Certainly other farmers in the Manawatu under similar circumstances have had excellent results from topdressing and oversowing in early spring. The use of molybdenised superphosphate would also probably have improved some of the earlier sowings, for there has undoubtedly been an improvement in establishment where it has been used.


PLAN OF FARM SHOWING

OLD AND NEW SUBDIVISION

Pasture Management and Subdivision

Pasture management and production have improved in relation to the increase in subdivision, topdressing, and stock numbers. Initially, owing to the small number and large size of paddocks, it was difficult even with mob stocking to clean up the rough, unpalatable herbage on the steep faces with sheep because of the relatively low concentration of stock. Some of the paddocks were then well over 100 acres and with less than 500 ewes on the farm the greatest possible concentration was sometimes less than 5 ewes per acre. Now, with the paddocks averaging just over 30 acres and more than 1,000 ewes available, paddocks can be stocked at 30 ewes per acre.

As subdivision and stock numbers increased pasture utilisation improved, but a few areas still need closer grazing to allow clovers to come away. Cattle grazing, particularly in winter, and heavy concentrations of sheep in summer and early autumn have, however, been very effective in bringing rank growth under control. Once this is done and the clovers are given an opportunity to grow, palatability and fertility improve and it is then relatively easy to keep pastures in good order.

Improvement in the pastures has been gradual rather than spectacular and even now they are still very poor in parts, particularly on the exposed faces. Light reseedings with clovers have been necessary in some places, but the spelling of paddocks in early summer to allow the clovers to reseed has resulted in a marked improvement in the clover content of several of the pastures. With an intensification of phosphate topdressing and periodical use of lime and molybdenum further marked improvements can be expected.

Because of the high cost of posts and battens, lack of fencing timber on the farm, the rocky nature of the soil in places, and the need to manhandle materials for considerable distances owing to the steepness of the country, it was decided to use Hunter-type fencing instead of the more costly orthodox post and batten type. Apart from some rusting of the chains, due to poor galvanising, this type of fence has proved very satisfactory.

Stock and Grazing Management

Paddocks are rotationally grazed for most of the year, including the lambing period, but the system has always been flexible. Frequency of stock shifts has been governed largely by such factors as the time of the year, the number of sheep in relation to the

The original pastures were practically devoid of clovers and unpalatable to stock.

Improved pasture, showing dense clover growth and even grazing.

quantity and quality of feed available, the class of stock (ewes and lambs, hoggets or dry sheep), and whether feed was being conserved for later use.

The needs of both stock and pastures have to be taken into consideration in any system of good management, and modifications as a result of experience have been made to meet the various requirements of both. The general practices being applied on the farm at present are broadly as follows:

Throughout winter all the ewes are run in one mob and are shifted frequently, often daily, to a fresh paddock, with the hoggets grazing the same paddocks a few days ahead of them. The aim here is to graze the pastures leniently so that they will recover rapidly. During lambing the ewes are shifted daily, the ewes with lambs being left behind. Every few days the ewes with lambs are shifted forward and grouped in one paddock and by the end of lambing most of the paddocks are filled up with the requisite number of ewes and lambs. From then on set stocking or alternate grazing of two paddocks is practised until shearing, when mobbing up begins again.

Shearing usually starts in late November and as the farmer does the job himself, it is very convenient to have the sheep in relatively small mobs. From the start of lambing right through to weaning, when they join the main mob of ewes, the hoggets are set stocked in one paddock or graze two paddocks in a part of the farm where they will not interfere with the normal rotation of the ewes. After lambing the dry ewes are grazed with the hoggets.

The gradual mobbing up of ewes and lambs as shearing progresses coincides with an improvement in pasture growth, and during December one or two paddocks are closed to grazing for the dual purpose of allowing the clovers to reseed and to provide a mature type of feed for lambs when they are weaned in January.

After weaning all the ewes, including the 2-tooths, are run as one mob and are again rotationally grazed right through to lambing. During summer and autumn the mob is sometimes confined to paddocks for several days to clean up rank growth. This allows the spelling of other pasture and mature feed to accumulate for the hoggets and also conserves feed for flushing or for winter feed for the ewes. The cattle are shifted round as required to clean up any rough feed left by the sheep.

As water supplies and tracks are adequate and there is very little gorse and manuka, development of the farm has been fairly straightforward. Lack of finance has been the main limiting factor. A farm of this type and size can be managed efficiently by one man with the employment of labour for shearing and the construction of new fences. Shepherding and maintenance of fences are the main duties, but with a system of mob stocking and rotational grazing the time spent on shepherding is kept to a minimum and this leaves the farmer free to spend some time on improvement work such as fencing.

On an all-grass farm such as this there is no need for elaborate equipment; in fact, apart from a hack and dogs, the main requirement is a suitable vehicle to cart out fencing materials. An old crawler-type tractor and sledge have been used for this, but because no cultivation is done, little use is made of the tractor and a light 4-wheel-drive truck would probably be more suitable, as it could be used for other purposes.

Results

The practices applied have worked fairly well so far and results have generally been good, but further improvements can still be effected. There is sometimes a fairly acute shortage of good feed before and after lambing and if stock numbers are to be increased, greater provision will have to be made for this period. Greater restriction of grazing after tupping to conserve feed for later use is perhaps the logical solution, but the growing of an area of winter crop may have to be considered. However, this would entail a fairly considerable outlay on implements and might not be economical, and, in any case, there is a fairly limited amount of cultivable land.

Feed is often short on most hill farms in early spring, but early growth is closely related to fertility and as it improves on this farm so will the supply of feed. However, despite periodic shortages of feed the lambs are generally fairly good. Not only do the best wether lambs usually make top prices at the local sheep fair, but the percentage of tops continues to increase each year. With the provision of good, mature feed hogget illthrift has not occurred and, with the exception of one year when the hoggets were not drenched for parasites, losses have been extremely low.

The increase in sheep numbers, though slow at first, has been faster in recent years and the expected increase ultimately eventuated. Because of the need for increased numbers of sheep it has been necessary to

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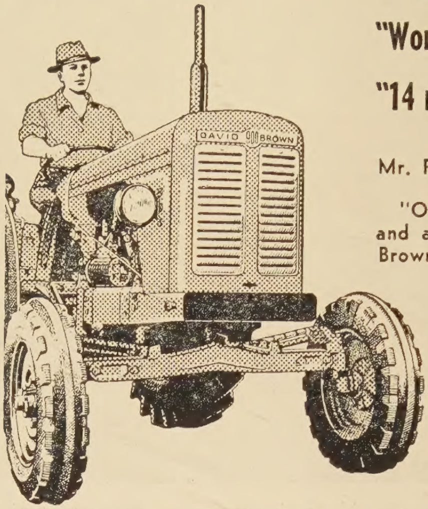

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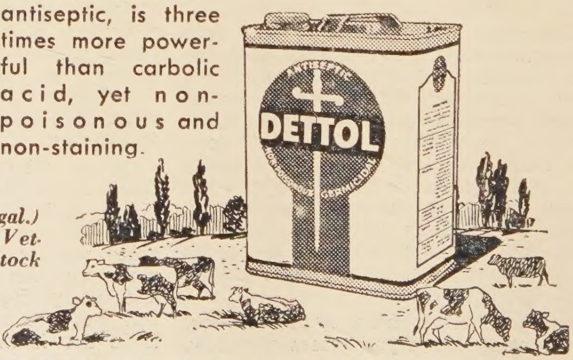

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▲ After weaning lambs are put on to conserved pastures. Beside providing good feed for the lambs, closing of paddocks allows clovers to reseed.

retain some of the older ewes for an extra year and to keep all of the ewe lambs that could be expected to survive the winter. Consequently no attempt has been made so far to select breeding stock on a quality basis, and as might be expected under the circumstances there has been a resultant decrease in the average fleece weight.

Breeding Cows

A herd of black polled breeding cows is run, mainly for pasture control. Numbers have been increased only slightly, as the need for cattle has decreased as the pastures have improved, but it would probably have been advisable to have used more cattle to clean up roughage in the early stages of development. The general policy has been to sell yearling steers and aged cows in spring and to keep all of the heifers for breeding, but sometimes heifers have been sold to regulate the size of the herd.

The increases in carrying capacity and wool weights are set out as follows.

CARRYING CAPACITY AND WOOL WEIGHTS

	1950	1954	1958
Sheep			
Ewe hoggets ..	143	184	326
Ewes	497	680	1,012
Wether hoggets ..	11	12	6
Mixed age wethers	12	7	20
Rams	20	14	30
	683	897	1,394
	lb	lb	lb
Wool weight ..	6,674	8,035	11,700
Cattle			
Breeding cows ..	23	25	30
Heifers under 1 year	5	8	12
Heifers 1 to 3 years	8	13	10
Steers under 1 year	14	9	13
Steers over 1 year	3	8	1
Bulls	1	1	1
Dairy cows ..	2	3	2
	56	67	69

COST OF DEVELOPMENT

	£	s.	d.
Fertiliser: 161 tons of superphosphate, 20 tons of lime, cartage and spreading ..	2,558	18	4
Clover seed: 825 lb of white clover, 490 lb of subterranean clover, 50 lb of *Lotus uliginosus*	331	11	3
Fencing: Materials, cartage and erection	1,149	10	0
Total cost	4,039	19	7

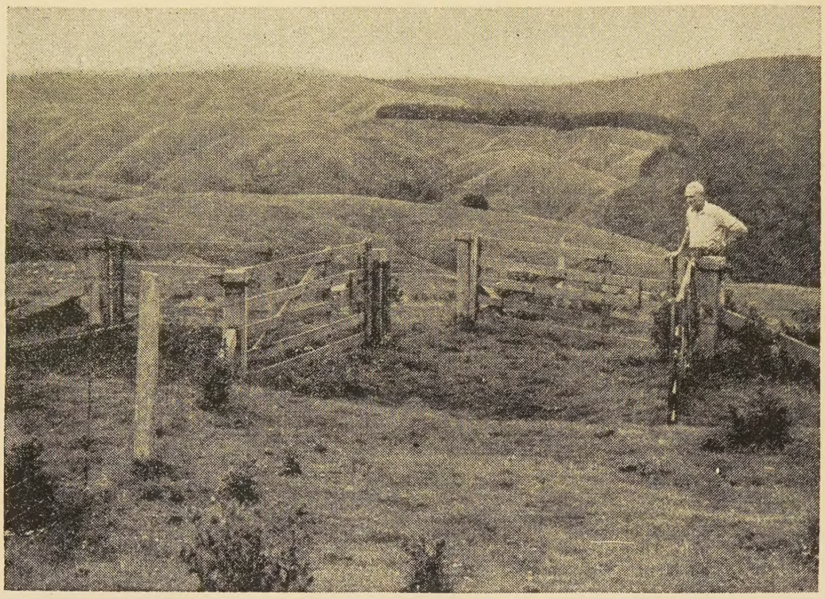
An analysis of these figures shows that the total improvement cost per acre was £7 17s. 9d. Wool weight increased from 13 lb per acre in 1950 to 22.9 lb in 1958 and ewe equivalents per acre from 1.8 to 3.2. Altogether about 6.2 cwt of superphosphate was applied per acre, or about 4½ cwt for each ewe equivalent increase. The length of new fencing was 171.2 chains and the cost per mile was about £530 or £6 12s. 6d. per chain. Clover seed used averaged 2.6 lb per acre, costing 12s. 11d.

Conclusions

Though the original programme has in the main been adhered to, slight variations had to be made to meet particular circumstances, and no matter how well planned a programme might be, mistakes are bound to be made and unforeseen problems arise. Perhaps the most serious mistake made on this farm was in developing the higher, harder, and more exposed south-west block first instead of the easier, more fertile north-east block.

It is now an axiom in hill country improvement to develop the better land first; to endeavour at the start to raise the level of the poorer country to that of the better areas is unsound. Undoubtedly the better land should be made to produce at a higher level before an attempt is made to increase production on poor, back areas.

Phosphate is the essential fertiliser on the hill country and 2 cwt per acre dressings applied to the farm were probably inadequate, especially the



Having four gates at the centre corners of four paddocks contributes to easy movement of stock.

initial dressings, when clovers were being oversown. A dressing of at least 3 cwt per acre would have been advisable to establish high-producing clover on low-fertility areas, and regular applications for two or three years afterward should have followed. However, as, initially anyway, subdivision, fertiliser supplies, finance, and means of applying fertiliser were all limited, it is probable that the topdressing policy was correct under the circumstances.

Adequate Stocking a Problem

One of the greatest problems with hill country improvement is undoubtedly that of providing the additional stock necessary to effect financial and physical improvements. Usually where carrying capacity is low income is correspondingly so and it is often difficult to finance development from revenue, especially in the early stages. On farms where this applies it may be possible to obtain finance through the Marginal Lands Board to pay for subdivision, water supplies, track construction, and the initial topdressings and oversowings.

This would enable the farmer to retain the maximum number of lambs to build up his flock. This has a snowballing effect and after a few years the additional income obtained can be used to effect further improvements and repay any loan money. Further, with more stock being carried, not only is the fertility of the land being built up, but replacement stock can be selected on a quality basis. Consequently more and higher quality wool can be clipped and better lambing percentages can be expected.

The improvement of hill country pastures is closely related to grazing management. In addition to regular topdressing and oversowing controlled grazing can result in a substantial increase in overall production on most hill country farms. In far too many instances, as on this farm, the full benefit from the topdressing done is not yet being obtained, nor is the increased pasture growth being fully utilised, through understocking and lack of adequate subdivision.

The key to better grazing management is undoubtedly adequate subdivision, but because of the high cost of fencing this is usually a long-term project on most properties. However, it is always a wise first step to draw a plan of the farm and site the fences in relation to water supplies, tracks, sunny faces, and dark faces, or, where practicable, to separate the flattish tops from the steeper faces. Adequate subdivision permits intensive or rotational grazing and stock can be fed according to their age and needs throughout the year.

It is not suggested that this farm should be used as a model, for many hill country farmers have had far more spectacular increases in production, but the results have illustrated that careful attention to long-range planning will usually yield worthwhile dividends.

Long-range Plan

Any hill country improvement programme should be based on a long-range plan to embrace the building up of fertility and carrying capacity through regular topdressing with the correct fertilisers, oversowing with the right kind of clovers, stocking to the limit, and better subdivision to enable systematic and controlled grazing to be carried out. Where initial development cannot be financed entirely out of income, consideration should be given to borrowing to assist with this early work.

Map on page 402 by Department of Education.

Meteorological Records for September

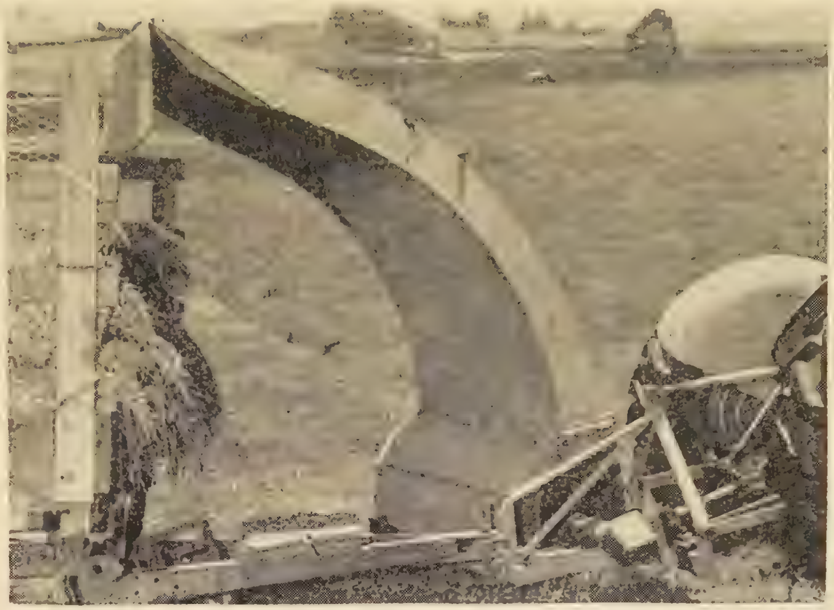
Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	240	54.6	+ 0.8	74.3	37.0	4.67	12	— 0.47	1.79	27	185
Auckland	160	56.2	+ 1.7	67.9	43.0	1.63	13	— 2.16	0.61	27	182
Tauranga	12	52.4	— 0.2	67.7	35.0	4.14	12	— 0.08	1.52	27	181
Ruakura	131	51.8	+ 0.9	68.9	32.1	4.06	13	+ 0.38	1.47	28	168
Whakarewarewa ..	1,006	50.1	+ 1.1	68.9	31.4	4.28	10	— 0.46	1.35	19	141
Gisborne	14	53.2	+ 1.1	73.8	35.2	2.34	11	— 0.28	0.95	27	172
New Plymouth ..	160	53.6	+ 1.9	65.2	38.9	5.01	12	+ 0.11	1.42	18	131
Karioi	2,125	46.5	+ 1.5	66.5	29.5	2.72	11	— 1.55	0.51	30	
Napier	5	53.8	+ 1.8	73.0	33.3	2.22	7	+ 0.25	1.35	27	176
Wanganui	72	53.8	+ 1.7	69.8	37.1	2.59	12	+ 0.05	0.62	30	140
Palmerston North ..	110	52.9	+ 2.4	66.5	32.0	2.69	16	— 0.32	0.79	19	124
Waingawa	340	50.8	+ 1.5	69.0	26.9	3.82	12	+ 0.55	1.35	27	128
Wellington	415	52.0	+ 2.1	61.7	36.6	5.85	13	+ 2.01	1.55	28	138
Nelson airfield ..	5	50.2	+ 2.0	65.4	32.2	3.63	14	+ 0.47	1.02	30	155
Blenheim	12	52.2	+ 2.0	70.1	30.1	2.71	12	+ 0.43	0.64	17	180
Hokitika	15	49.4	+ 1.6	62.8	33.5	11.73	20	+ 3.11	2.56	15	106
Hanmer	1,270	48.1	+ 2.0	67.0	27.4	3.63	12	— 0.80	1.19	30	158
Christchurch ..	22	50.9	+ 2.2	73.8	31.4	0.24	5	— 1.82	0.08	13	172
Ashburton	323	50.6	+ 2.7	74.8	28.2	0.48	7	— 2.14	0.21	30	160
Timaru	56	49.9	+ 2.0	72.7	32.0	0.47	6	— 1.48	0.21	30	166
Alexandra	520	48.4	+ 1.3	67.0	26.4	0.83	9	+ 0.01	0.42	30	208
Taieri	80	48.2	+ 0.5	70.0	25.7	0.77	9	— 1.16	0.37	1	186
Invercargill airfield ..	0	47.8	+ 2.1	67.8	30.2	1.92	15	— 1.30	0.38	15	165
Chatham Islands ..	150	49.0	+ 0.8	59.1	34.4	1.65	11	— 0.78	0.76	25	

Forage Harvester System of Making Silage or Hay

By J. L. DOUTRE,
Machinery Instructor, Auckland
and
B. A. GUNNING,
Farm Advisory Officer, Matamata,
both of Department of Agriculture

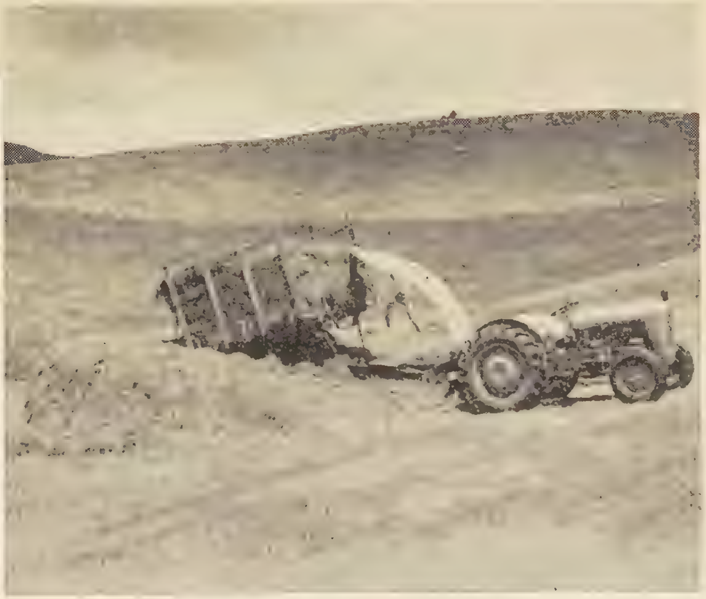
THE forage harvester system of making silage or even hay from pastures promises some distinct advantages in actual handling and in provision of larger amounts of better supplementary feed. However, efficient operation of the system depends as much on adapting farm management practices as on the availability now of cheap forage harvesters. This article explains what the harvesting system entails on both one-man and larger units and the resulting overall advantages in the running of a property.

DURING recent years a marked trend toward cutting increased areas of pasture for silage has been made possible by improvements in farm mechanisation. For some years

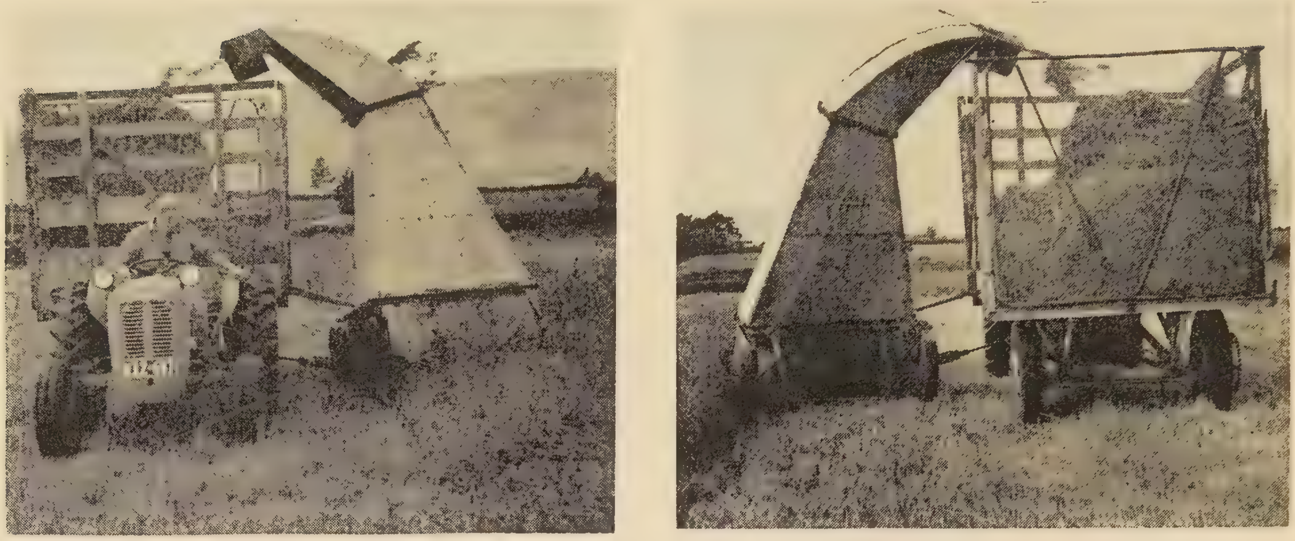


This farmer-designed forage harvester operates on three-point linkage straddling the left wheel track. The trailer hitch point is directly behind the tractor.

The one-man forage harvesting unit cutting and loading grass into the trailer on rolling country.



The trailer still attached to the forage harvester is easily reversed to the unloading site. Trench or pit storage would make unloading easier.



The farmer has designed a novel forage harvester which is towed alongside the trailer. It is quickly detached when the trailer is full and left in the field while the load is dumped at the pit. The harvester is driven from the tractor power take-off through a cross-shaft fitted to the trailer tongue. The rear view (right) shows the hitch and drive arrangements.

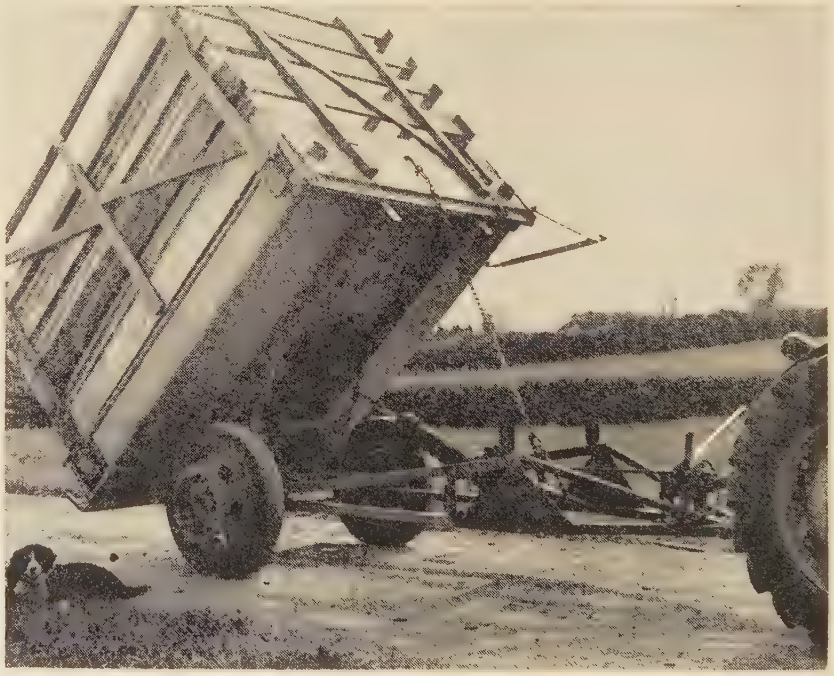
the buckrake has held the position of silage making implement "par excellence", but it now threatens to be replaced by new, cheap forage harvesters, which are creating intense interest. The adoption of the forage harvester system allows—indeed necessitates—improvements in farm management.

When the forage harvester is used it is possible to harvest a large area of immature crop instead of cutting a few paddocks of heavy, mature, and often stalky growth. This is desirable, firstly because the forage harvester deals better with light crops, and secondly because immature crops produce better silage and hay and cause less pasture deterioration.

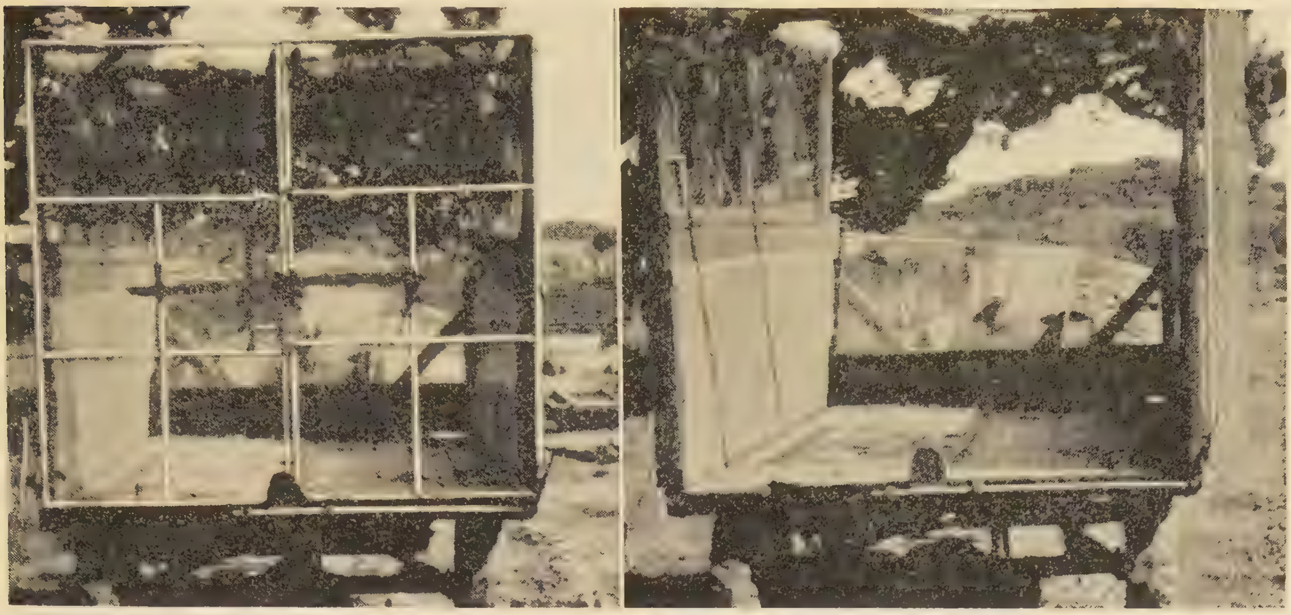
On some farms where a forage harvester is used no paddocks at all are closed for harvesting as silage; instead, all pastures which get beyond control by stock are topped. Instead of say 20 per cent of the farm area being cut for silage, the whole farm may be topped two or more times.

Advantages

With this system pastures are always well controlled and stock thrive. No pasture gets away too far, so that there is no undue opening up of the sward, smothering of clovers, or depletion of soil fertility. Aftermath production is better. No pasture is allowed to get stalky, with the result that the herbage conserved is leafy and capable of mak-



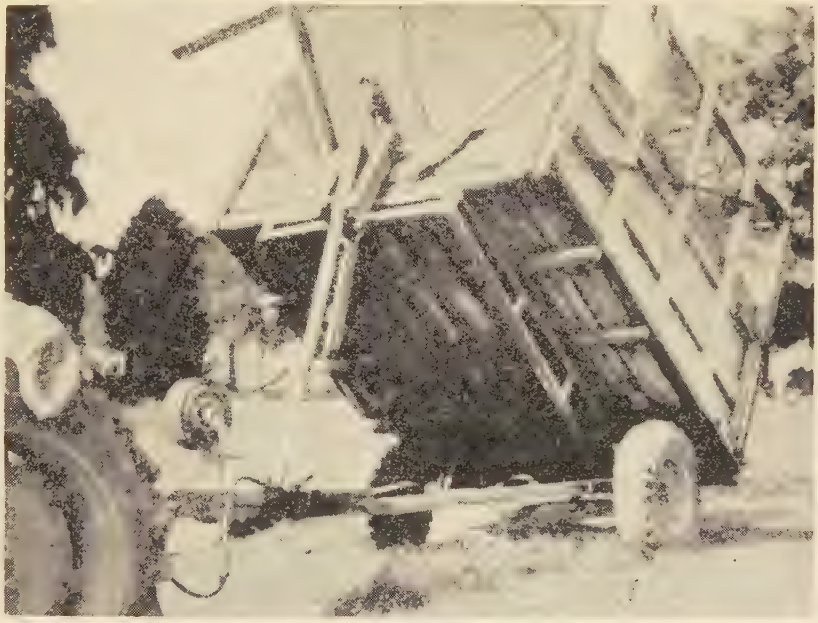
The versatile trailer shown in the unit above is fitted with a cage to hold grass silage from the forage harvester. The cross-shaft for driving the harvester is fitted on the tongue. The hydraulic ram is operated by tightening the belt (arrow) by the lever and so engaging a hydraulic pump.



This trailer, which is tipped by a telescopic ram (see illustration below), is wider at the back than at the front so that the load falls freely. The two gates forming the back fold round the sides out of the way (right) when the trailer is being unloaded.

ing first-class hay and silage. The material harvested is a true surplus and there is no risk that large paddocks closed in a mood of optimism will have to be reopened when they are too mature for grazing. Very close subdivision fencing is therefore to that extent unnecessary, as is topping for topping's sake.

The waste represented by toppings in a favourable season is often surprising. For example, on one farm near Matamata pastures are normally topped in December with the hay mower after silage harvesting is completed. Last season, a year of prolific pasture growth, a forage harvester was used to remove the toppings, which were placed in a pit as silage. One hundred 1½-ton trailer loads of green material were ensiled. It was calculated that the 150 tons of green material would produce 125 tons of cured silage—enough to feed 40 lb per day per cow for five weeks to the 70-cow herd.



The telescopic ram is operated from the tractor hydraulic system. The pivot wheel at the front of the trailer is in the "up" position adopted for transporting of the loaded trailer.

When the forage harvester is used to advantage production from the dairy herd during spring can reasonably be expected to be higher. Normally, grazing during spring is dictated by two conflicting requirements; the herd will produce better if allowed free range over a relatively large area, but under such extensive grazing "clumpiness" will appear in the pastures, and further, insufficient areas will be available for the making of silage and hay.

Consequently, when harvesting with conventional equipment it is necessary to confine the herd to some degree, either with the electric fence or with close permanent subdivision. When a forage harvester is used, however, the herd can range more freely and any clumpiness can be removed by harvesting it. The labour requirement for electric fencing or the capital cost of intensive permanent subdivision can thus be avoided.

When freer range is given the herd pastures may be grazed at a taller growth stage. Under very restricted grazing it is necessary to keep the pastures in a short, palatable growth stage so that high intake is maintained. On leniently grazed pastures, however, the total herbage output is much higher, and to the extent that a forage

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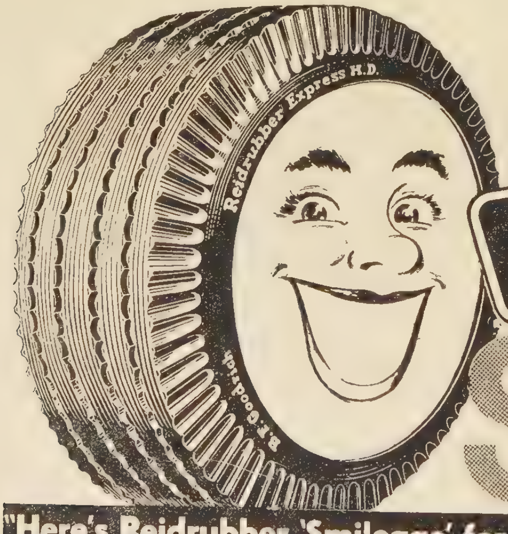
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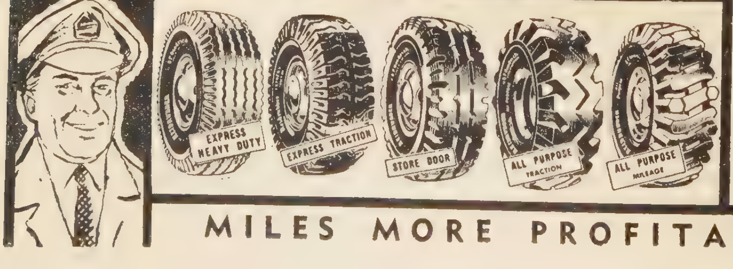
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FORAGE HARVESTER FOR SILAGE AND HAY

Single-purpose curtain-roll unloading trailer with tongues at either end for easy handling and quick turnround. When full the trailer is hitched at the free end to another tractor and as one trailer is pulled away another can be pulled in behind the forage harvester by using a snatch block and wire rope.

harvester makes lenient grazing possible, it also contributes to total herbage production. In leniently grazed pastures also the clovers seldom become aggressive, with the result that bloat is less prevalent.

Troublesome pasture weeds become less of a nuisance with a harvesting system which involves topping of large areas once or more often during spring and summer. Unpalatable weeds may be turned into palatable silage, and though the feed value of this may not be high, at least the weeds are prevented from reseeding and most of the seed that is harvested will be destroyed in the ensiling process.

In brief, by the alteration of farm management practices the forage harvester could be made to replace conventional equipment such as buckrake and mower with little or no extra capital cost and could be operated with less labour. The change could make increased production possible by allowing or even necessitating improved management.

However, to make the change-over worth while it is necessary to adopt the forage harvester as an integral part of a system of farming, not just as an alternative to the buckrake.

The feasibility of adoption of the system depends also on the availability of relatively cheap, one-man forage harvester units for use by individual farmers or of dearer, two- or three-man units, with a correspondingly higher output, mainly for contract work.

Silage Making

The relative merits of silage and hay are often debated but, though both have their place, most farmers agree that silage is the more useful material. The increasing popularity of silage is certainly due in large part to the fact that it has a greater range of usefulness: For dairy cows it can be used in early spring to supplement autumn-saved pasture; in late spring to counteract an outbreak of bloat; in late summer for maintaining milk production; and in winter as a maintenance ration.

Silage is cut early, thereby encouraging a greater production of pasture aftermath than after late-cut hay, and there is less damage to pastures through opening up of the sward. Silage making can also be proceeded with without risk from the weather.

The factor which detracts from the attractiveness of silage making, however, is the high labour requirement, both for harvesting and for feeding out. Machinery can be used to replace labour, the use of the forage harvester type of machine being the extreme in mechanisation.

All forage harvesters chop and lacerate the material they harvest, which assists in obtaining better compaction of the material. Air is excluded and overheating, which destroys protein and carbohydrate, is eliminated. The bleeding of grass leaves also perhaps assists in the production of a desirable type of silage; the forage harvester seems to make better silage than can usually be made with other implements. During observations on a number of properties it has been uncommon to see poor silage produced by a forage harvester.

Because of the compaction produced in the mass good silage can be produced late in the season from material which is otherwise considered too dry to pack sufficiently to prevent excessive heating. The compaction extends right to the top of the stack or clamp, so that the commonly observed dark, overheated zone on tops of stacks seldom occurs on those built with a forage harvester. The compaction of the top layers produces a seal on top which gives considerable protection from the weather.

Storage of the silage either in pits or trenches or in above-ground clamps is possible, though the latter are more laborious to build with the short chopped material and require either hydraulically operated high-tip trailers or curtain elevator unloaders which will operate even when going down the wedge slope. Wooden or more permanent, concrete bunker sides reduce waste and make filling and compacting safer and much easier.

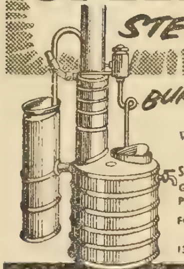
Provision of a concrete floor and feeding apron permits self-feeding, which is becoming increasingly popular. The forage harvester system, since it places heavy loads on very mobile trailers, facilitates transport of material to such permanent sites. Chopped material is easily extracted from the feeding face by stock and little is wasted on the ground. There is no need for cutting with a knife, as chopped material is easily forked for feeding out in the orthodox way or for the loading of trailers with front-end loaders or rear-mounted silage forks.

Haymaking

Harvesting with the forage harvester is not confined to the saving of silage. Forage harvesters have been used successfully for cutting hay crops, which are baled the same day as cutting or the day after. The forage harvester cuts, bruises, lacerates, and aerates the material while spreading it like a carpet on the sward. Drying is accelerated so that in suitable weather light crops cut in the morning have been baled the following afternoon.

The quicker hay is dried the greater is the saving of its food value, and the quality of the hay produced by the forage harvester appears extremely high. Hay produced by this method probably has a food value equal or superior to that of silage and hence would be very useful.

Since the hay may be dried in 24 hours, it is possible to harvest at any time when the weather seems fairly certain to remain fine for 24 to 36 hours. Thus haymaking could be carried out in November, when the weather is normally considered to be too unreliable, by the same machine



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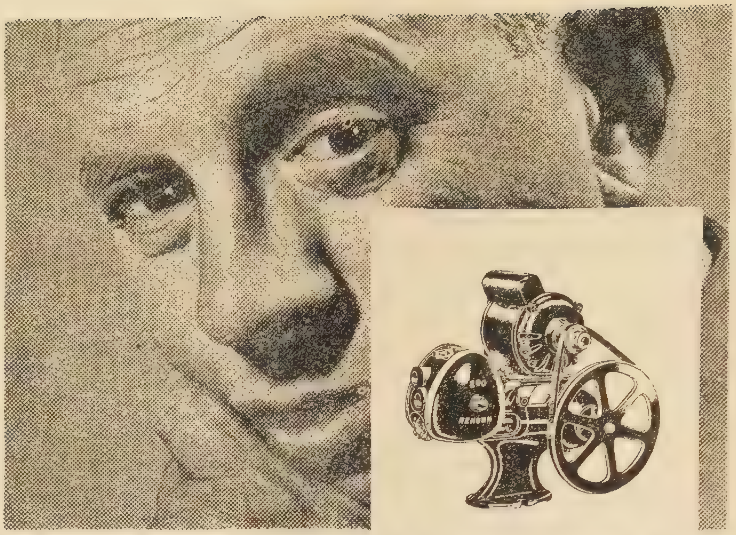

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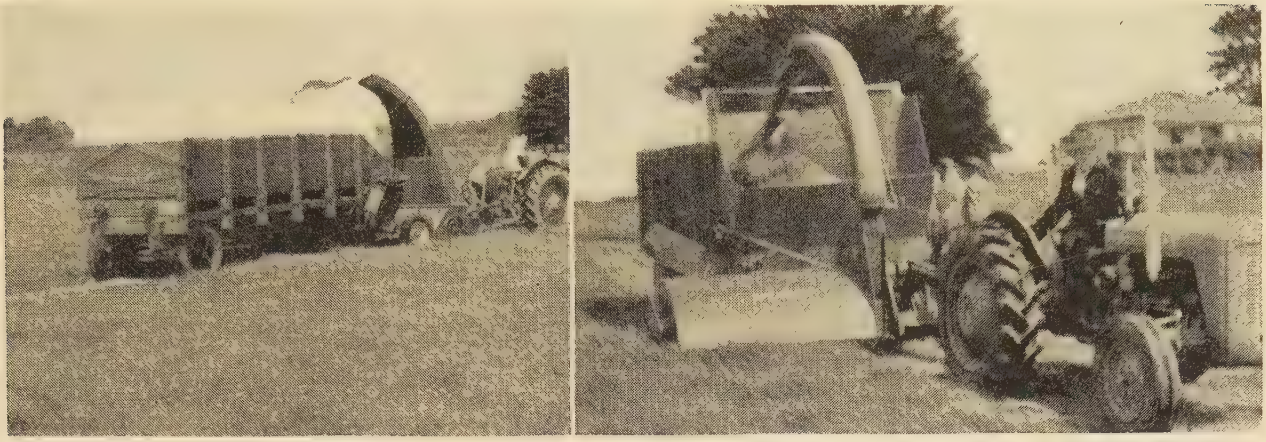


This large trailer is unloaded by chain and slats, which move the load out the rear door into the trench.

that makes silage making in January also attractive.

Some forage harvesters cannot compete with the hay mower for speed in a heavy crop. In light crops forage harvester speed compares favourably with that of the hay mower and it is recommended that light crops be harvested. The time-consuming sharpening of knives that slows up mowing has been mostly eliminated in the forage harvester, and because of this and less other maintenance the ultimate speed of harvesting can even exceed that of the mower.

A difficulty where hay is harvested as described may be arranging for contract baling.

Forage Harvester Development

The forage harvester has developed in the past four years from a chopper that picked up windrowed material from a mower and rake to the present flail-type, which does all these operations at once. It cuts, chops, elevates, and loads the material into a following or side-fitted trailer or truck.

When the trailer has been filled it can be replaced by another and the forage harvester continues to work as the first trailer is unloaded by another operator. With one-man operation the entire unit is taken to the trench or pit and unloaded, either by backing up the unit to the side or taking it through the trench or over a double-ended clamp. The silo site should be planned carefully to reduce to the minimum possible the distance of haul from paddock to silo. The speed with which silage is handled leads to greater overall efficiency in silage making.

Tractor Power Requirements

Fully effective use can be made of power available only when the tractor is used with a suitably matched forage harvester. Overloading a small tractor soon leads to overheating, power failure, and costly repairs. However, purchase of a bigger tractor to operate a 5 ft or larger forage harvester would be uneconomic on a small farm unless contract work is to be done also.

To operate a large forage harvester and pull a fully laden trailer over a farm requires about 7 h.p. per foot of cutting width. More power would be needed for work on rolling country or hills or with a heavy trailer. It is important either to have a tractor of sufficient power for forage harvesting or to buy a forage harvester within the limits of the tractor's power; otherwise it is better to rely on a contractor if a change to forage harvesting is to be made.

Tractors with live power take-off and a reasonable selection of gears have distinct advantages. Farmers should be fully aware of the power requirements before launching into the new system.

The Forage Harvester

The present forage chopper replaces the mower, the side rake, and usually the buckrake. It uses a rotary type cutter fitted with pendant knives. Centrifugal force and wind action similar to that of a fan are used to cut and elevate the material up through the delivery chute into a following trailer.

There are few moving parts and little wear, except to the linkage of the knives. The knife blades can be sharpened, but seldom are. Balance is most important; when the cutter rotor is turning at 1,450 to 1,700 revolutions per minute one ounce out of balance can cause severe vibration with damage to bearings and framework. The rotor should be in balance when revolving at any speed. Farmer engineering projects are often out of balance and can be dangerous. If a knife is bent or lost, it should be replaced immediately to maintain balance.

Forage Harvester Trailers

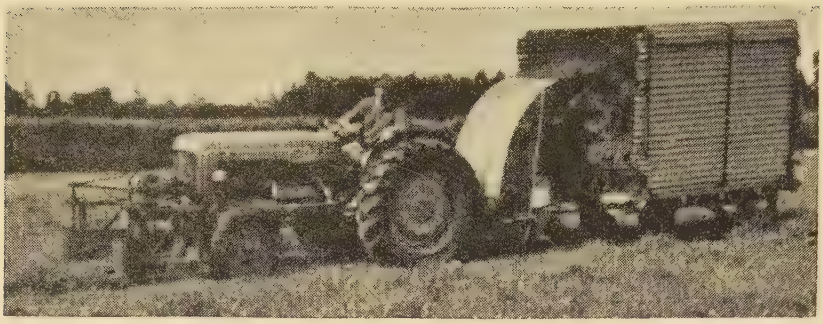
Probably as important as any other feature of the system is a serviceable trailer which can be readily adapted to hauling silage as well as to fulfil its other purposes on the farm. It must be versatile to justify its cost.

Usually the most versatile trailer is a hydraulic-tip type having a tipping angle of 65 degrees or more so that it will tip when going down hill through a trench. Such a trailer should bear heavily on the tractor with the wheels well to the back. If further support is required, a small wheel can be adapted to swivel under the tongue.

A cage framework that is readily removed from the deck is desirable. This should be wider at the back than at the front so that material will drop clear of the sides as soon as the load begins to move. Forage harvester trailers should have two gates at the back which can be quickly swung round the sides out of the way so as not to interfere with any tipping operations. Such a trailer has many uses on the farm and can be readily adapted to others, thereby reducing the cost chargeable to silage making.

Some trailers have drawbar tongues at front and rear with the wheels near the centre of the load when the trailer is full. This prevents the loaded trailer lifting the forage harvester up. When the trailer has been filled a second tractor is hooked on to the rear hitch to take the trailer to the pit. The trailer is wider at the front so that the load tips easily when the trailer is drawn in the reverse direction when taken over by the second tractor. A cable and snatch block may be fitted to pull the empty trailer into place.

FORAGE HARVESTER FOR SILAGE AND HAY



In this system cutting is done in front of the tractor, but the cut material is picked up, lacerated, and thrown into the trailer by equipment at the rear. The whole unit is taken to the pit and the trailer unloaded by sliding curtains operated by a hand crank.

This type of unloading restricts the trailers to one purpose and would therefore not be suitable on a small farm. The cost of curtains and transmission gear would also increase the annual cost of this type. Such trailers are suitable for contractors or farmers making a large amount of silage.

Considerable interest is also being taken in hopper-type trailers which can be filled from the top or front. They are of steel and a trip line disengages a lock and allows the material to fall out the back. When the trailer is empty the gate falls back into position, thereby saving the tractor operator from dismounting. A trailer of this type can be made more versatile by having a tray which replaces the hopper and makes a wide, low, flat farm trailer.

For one-man operation on the average small dairy farm a small to medium-sized tractor is suitable for operating a forage harvester 3 to 4 ft wide. Under these circumstances a system employing one trailer would be most economical. One operator would cut and transport the material to the trench or pit, dump it, and then use the tractor alone for consolidating.

Overseas studies suggest that the most efficient system is to:

1. Use one tractor and forage harvester-trailer unit to cut and transport to the pit.

2. Use another tractor fitted with a buckrake or front-end loader to fill the trench, pit, or bunker and consolidate it in a non-stop operation.

No time is then lost in connecting or unhooking trailers.

System of Operating

Probably no other crop on the farm lends itself to mechanisation as well as does grass for silage. Mechanisation is successful only when it fits into the farming pattern; it must conform to a desirable system in which no effort is wasted or time is lost. The forage harvester has ushered in a completely new system of operation.

Regardless of the method of operating with a forage harvester considerable planning is essential. Farmers considering adoption of the new system should be prepared to spread their costs to cover all aspects of machinery and facilities to ensure efficient conservation. The purchase of a forage harvester is only the beginning; if better silage is to be made, it must also be better conserved, and time and money will have to be spent to provide better facilities from paddock to pit and from pit to livestock.

The small dairy farmer will probably adopt the one-man system of operation whereby he does not have to unhook the forage harvester from the tractor or trailer during cutting and unloading. The material is cut and hauled to a site nearby or, if possible, unloaded directly into the pit or trench. Later, when further consolidation is necessary, he may have to unhook the tractor and use it for compacting. A buckrake may have to be used to push the material into place or fill holes. Two hours' cutting, one hour's cleaning up, and a repeat of this process may well be the method adopted.

Neighbouring farmers may choose to work as a team or a farmer may hire a man to assist. On larger holdings use of two tractors and two trailers with rapid hitch and unhitch linkage would probably be the best arrangement.

Forage harvesting lends itself very well to contracting, as it is little affected by the weather. Contractors in the Auckland district have begun harvesting in October and continued until mid March. Some use powered forage harvesters which they tow by trucks.

Storage Facilities

Improved storage facilities are a real need in efficient silage making. It is not uncommon to see up to 40 per cent of the material wasted by poor conservation. On flat country where open clamps have been usual many farmers are now turning to walled silos, because of the ease with which material can be ensiled and because there is little waste at the sides due to oxidation of conserved material.

When the material is to be stored until late winter or for another year covering is most important to conserve the material on top and at the sides. In the Auckland Province sawdust has been found the most useful cover.

Several types of silos can easily be built with available farm labour. Where ground is stable, drainage is good, and rolling country can be taken advantage of, the trench is the easiest and cheapest. In unstable ground trenches must have concrete sides and hard bottom. On flat ground the bunker type can be readily constructed at a reasonable cost. Tower silos are not suitable, mainly because they are expensive to build and to fill and empty because of the special machinery needed.

Disease Control Appointment

DR S. JAMIESON, who has been appointed to the new position of Chief Advisory Officer (Infectious Diseases Control) in the Department of Agriculture. He was Senior Lecturer in Agricultural Bacteriology, University of Aberdeen, before joining the New Zealand Department of Agriculture in 1952 as Veterinarian, Wanganui. Dr Jamieson was appointed Supervisor of Tuberculin Testing in 1956.

During the outbreak of mucosal disease early this year Dr Jamieson was in charge of the special control organisation established in the Wairarapa and later at Waipukurau. In the United Kingdom he had wide experience in diagnosis and control of animal diseases and did a considerable amount of research.

Dr Jamieson is a Doctor of Philosophy (University of Aberdeen), a Member of the Royal College of Veterinary Surgeons, and holds a Diploma in Veterinary State Medicine.

SPANISH HEATH Can be Controlled and Land Free of It Protected Against Infestation

By W. F. LEONARD, Scientific Officer, Department of Agriculture, Christchurch, and J. P. BEGGS, Farm Advisory Officer, Department of Agriculture, Blenheim

RESEARCH by the Farm Advisory Division of the Department of Agriculture in Marlborough during the past 10 years has been directed to retaining or restoring for grazing land either in danger of infestation with Spanish heath or already infested. The approach has been to seek an effective and practicable method of dealing with existing stands of heath and a way of keeping land free of the weed once it has been destroyed or where infestation has not yet occurred. The spraying of chemicals seemed to offer the greatest prospect of killing heath and the key to protection from re-infestation was believed to lie in the raising of soil fertility.

Large areas of low-fertility land, particularly in Nelson and northern Marlborough, are either already infested with Spanish heath or threatened with infestation. From time to time during the past 30 years attention has been focused on its spread, especially in the Wairau Valley and Sounds areas of Marlborough.

THOUGH there are details of soil fertility which call for further research, trials have shown that heath can be controlled and, more important, that land free of the weed can be protected against infestation. The provision of competitive pasture cover is the long-term solution. If the soil fertility can be improved to do this, not only will the heath be permanently suppressed, but large areas of marginal land will be improved in productive capacity.

Distribution

The plant is often associated with tree heath (*Erica arborea*) and the extent to which each species occurs is not well known. Spanish heath (*E. lusitanica*) is, however, known to exist from Wellington to the central area of the North Island, probably extending further north, while in the South Island infestations are known in Marlborough, Nelson, North Canterbury, and about Reefton. It is likely that the plant is present in other localities, though not recorded.

Spanish heath is unpalatable to stock and concern has been felt at its threat to grazing land. Until recently, however, little was done to control it, probably because of two causes: firstly, no satisfactory means of killing existing hill country infestations was known, and secondly, the fact that heath is a weed of low-fertility soils only was not appreciated.

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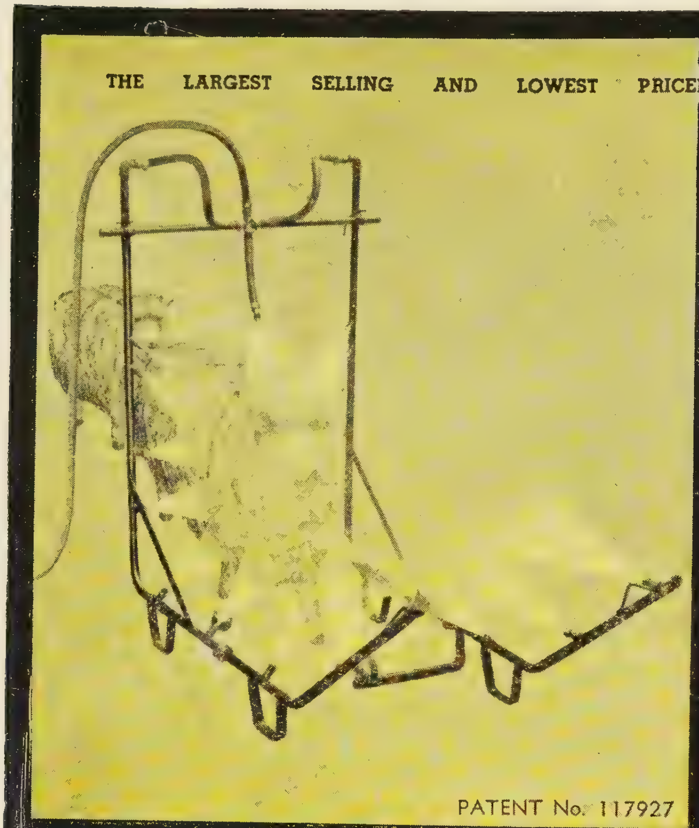
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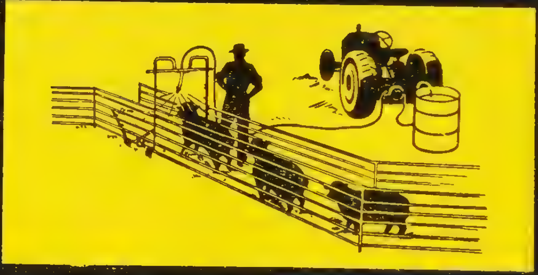

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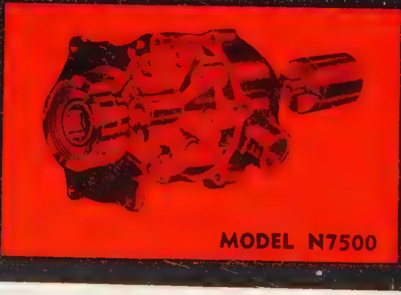
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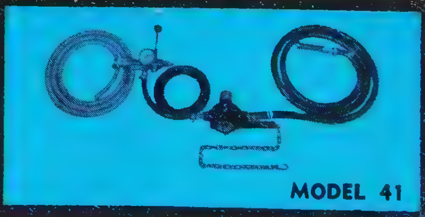
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Control Methods

Where land can be cultivated no great problem exists. Not only can the plants themselves be destroyed but, more important, on such land the soil fertility can normally be raised readily to prevent re-infestation.

Afforestation through tree planting or natural reversion is a possible alternative use for land infested with Spanish heath. However, if grazing of stock is the aim, some positive action is required to maintain these areas in production.

Chemical Control

Trials for killing existing heath were begun in earnest about the time that hormone-type weedkillers became available and in November 1947 and March 1948 trials with the ethyl ester of 2,4-D and the sodium salt of MCPA were laid down. The 2,4-D was applied as a spray at 1 lb acid equivalent per acre, and the MCPA at 1 lb and 3 lb per acre as a 1 per cent dust. Though a kill to ground level was secured, regrowth soon appeared at the bases of all plants. A second similar application to one trial gave equally poor results. Subsequent trials illustrated that a complete foliage kill could be secured by the application of any one of a number of herbicides, but great variation occurred in the amount of regrowth which followed their use.

In March 1952 a trial with the butyl and butoxy-ethanol esters of 2,4,5-T and mixed esters of 2,4-D and 2,4,5-T was laid down. The rates of application were 1, 2, and 3 lb acid equivalent per acre applied in 120 gallons of water. These rates as applied to the mixed esters refer to the total of the two ingredients which were present, in the proportion of 2 parts of 2,4-D to 1 part of 2,4,5-T.

The usual foliage kill followed application, but next spring a disappointingly large amount of regrowth appeared from the bases of plants on all 2,4,5-T plots. The regrowth was sprayed in autumn, but even this second application failed to kill all plants, though the number surviving on the 2 lb and 3 lb plots was considerably reduced. On the other hand plots treated with the mixture of 2,4-D and 2,4,5-T gave much better results. A good deal of regrowth appeared on the 1 lb plot, and little on the 3 lb one. A single re-treatment cleared the 2 lb and 3 lb plots of Spanish heath, this being in marked contrast to the pure 2,4,5-T treatments. An identical trial established a year later gave similar results.

The effectiveness of spraying is shown by the treated area in the foreground compared with the untreated area in the background.

Weedkillers Used

The superiority of the mixture over the straight 2,4,5-T suggested that further investigation into the use of 2,4-D might be worth while. Trials were accordingly laid down to test 2,4-D and a number of other materials which had become available since the original 2,4-D trials were established. Included were materials derived from the parent acids 4-CPA, MCPA, 2,4-D, 2,4,5-T, and 2,4,5-TP, among them being the mixture of 2,4-D and 2,4,5-T esters already mentioned.

Each material was applied at 2 lb and 4 lb acid equivalent per acre, one series being applied with water at 125 gallons per acre, and a second series with a similar amount of water plus diesel oil at 10 gallons per acre. Some regrowth appeared on all plots, and a year after the first application each was treated with its original material at 2 lb acid equivalent per acre, diesel oil only at 10 gallons being used as the diluting agent. In all cases the addition of diesel oil gave a greater kill than that obtained on the corresponding plots where water alone was used as the spreader.

The ethyl ester of 2,4-D emerged as the material to be recommended for killing Spanish heath, and diesel oil as a diluent to increase effectiveness. This ester is readily available, relatively low in cost, and gave a kill of heath equal to the best obtained in the trial. The success of 2,4-D on Spanish heath may appear surprising, but the results of these trials agree with work in the United States and England on related species. There, too, 2,4-D was more effective than 2,4,5-T.

Time of Application of Spray

The tip immersion technique was used in an effort to determine the optimum time of application. Results indicated that treatment during October to March inclusive is most likely to give satisfactory results. All the Departmental trials were laid down during this period, the majority being established in autumn.

Soil Fertility

While the trials with herbicides were in progress it was not forgotten that low fertility is the basic cause of heath on farm land. Pilot oversown and topdressed strips were laid through existing sprayed trials, and in the autumn of 1954 a detailed topdressing and oversowing trial was established on Tuamarina silt loam, the area having been sprayed a month earlier. Fertilisers used included superphosphate, sodium molybdate, and muriate of potash, while lime at 5 cwt and 2 tons per acre was superimposed on the

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fertiliser treatments. White clover seed at 3 lb per acre was broadcast over all plots.

Clover seedlings appeared in large numbers, but within a few weeks those on certain plots became yellow and died, while those on other plots thrived and soon provided a dense ground cover of vigorous white clover. These results were achieved on a soil of very low fertility and one on which only such low-fertility-demanding species as browntop, gorse, *Pinus radiata*, and Spanish heath manage to survive.

Though marked responses to phosphate and molybdenum in the absence of lime had been recorded in parts of the Sounds area, clover establishment in this trial was nil on plots without lime. However, with lime at 5 cwt or more per acre these fertilisers gave outstanding results. Because of the success of the light rate of lime, lower rates ranging from 4 cwt down to 1 cwt per acre were added next autumn, and 3 cwt per acre proved the minimum rate at which white clover would establish and grow vigorously.

Liming and Seed Inoculation

Treatments with low rates of lime and with rhizobium bacterial culture are being investigated, these treatments being superimposed on basal applications of phosphate and molybdenum. Bacterial culture has allowed white clover to establish and grow reasonably well without any applied lime, and quite vigorously with lime at 1 cwt per acre. The relationship between lime and bacterial culture in clover establishment is still not clear and research into it is being continued.

Permanent Eradication

Up to the present all plots on which clover establishment was successful have supported a dense cover of grasses and clover and, most important, during the five years since the first plots were laid down no Spanish heath has regenerated on the plots. Those on which clover failed to establish had in only two years become re-infested to a greater degree than before treatment.

Costs

If the density of Spanish heath plants is so great that spraying is essential before pasture establishment can proceed, the cost of herbicide would be about £2 10s. per acre. Application by air would cost a further £2 per acre.

The results of oversowing after spraying, showing white clover on a lime-molybdenum plot.

Spanish heath can be killed with 2,4,5-T ester, but higher rates and more frequent applications are needed of this material, which is much more expensive per gallon than the ester of 2,4-D.

Prevention Better than Cure

The most effective way of minimising the cost of Spanish heath control, however, is to forestall infestation by improving soil fertility. The spraying of existing Spanish heath plants is then avoided. Where this is done heath control becomes synonymous with normal land improvement and the same techniques apply.

In an area with parent Spanish heath plants the prolific seed production and the many avenues of dispersal make prevention of seed spread practically impossible. Such agencies as sheep, cattle, goats, deer, wild pigs, birds, and wind no doubt contribute to the distribution of the seed and this is one reason why land improvement is considered the best approach to the problem.

Where land is too steep for cultivation, fertiliser and seed would be distributed from the air. The cost would vary with the type and quantities of fertiliser required, the location of the property, and so on. As land infested with Spanish heath or in danger of infestation is generally of low fertility, fairly heavy initial fertiliser dressings will usually be needed. The local officers of the Farm Advisory Division can provide detailed advice for farmers and he should be consulted.

The Future

With the uncertain economic outlook the cost of land development may be regarded as high and this is one important reason for careful planning. If the project is developed block by block, the cost of fencing (which is vital to any land improvement programme) can be spread over several years, grazing can be satisfactorily managed, and increased stock numbers can be progressively reached.

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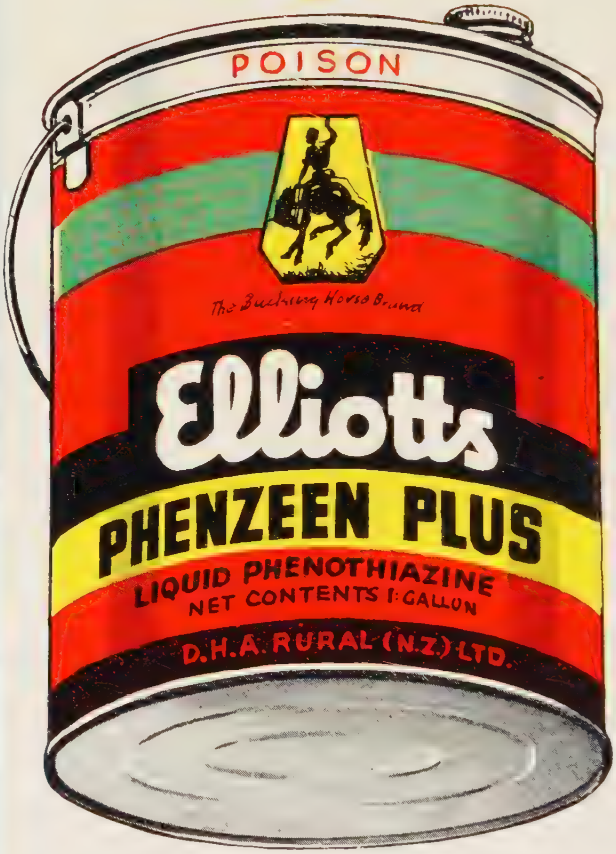

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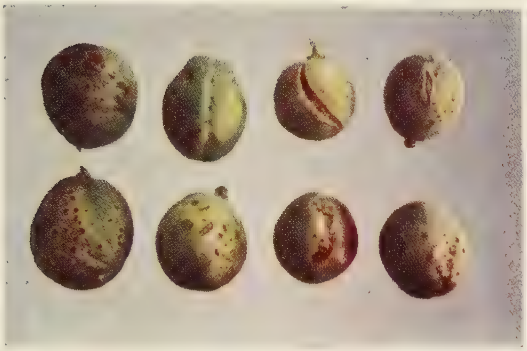
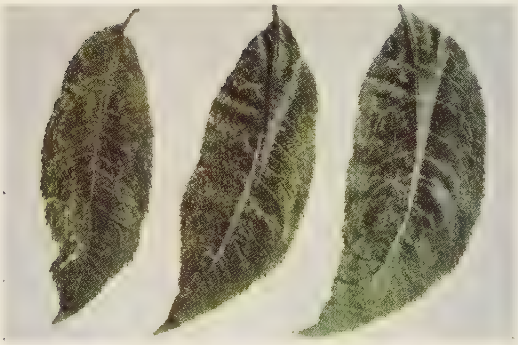
HORTICULTURAL RESEARCH

Fruit symptoms . . .



. . . of yellow leaf spotting

Leaf symptoms . . .



Yellow Leaf Spot and Fruit Pimpling and Cracking of Nectarine and Peach

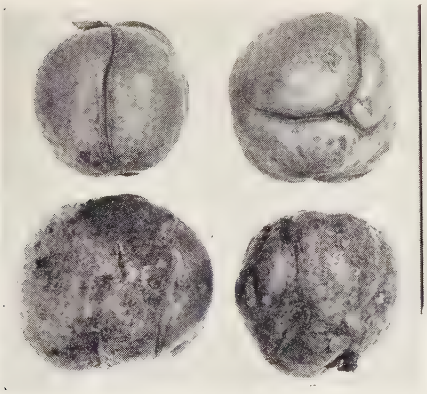
SOME varieties and blocks of nectarine trees in the Alexandra district have for many years produced malformed, spotty, and cracked fruit. Though damage is not of the same intensity every year, incidence appears to be increasing. Attempts at eliminating the damage, mainly along the lines of a possible trace element deficiency, have been unsuccessful. Recent trial work has shown promising results on both Hunt's Tawny and Goldmine nectarine and seems to point to the fruit injury being caused by eriophyid mite or capsid bug damage in the early stages of fruit development.

By W. S. KEMP,
Horticultural Instructor,
Department of Agriculture,
Alexandra

THOUGH the trials are not yet conclusive, publication of results to date may enable growers with similar fruit conditions to undertake their own trials and thus give a wider field from which information could be obtained.

Though the preliminary work has been confined to Hunt's Tawny and Goldmine, most other nectarine varieties are known to show similar symptoms in some orchards. Cardinal and John Rivers are two varieties sometimes showing severe symptoms.

Fruit symptoms vary from a reddish spotting or scabbiness to severe cracking and distortion, often with gum exudation (Fig. 1). There are also usually leaf symptoms, though these are more apparent in some varieties than others. They comprise a yellow



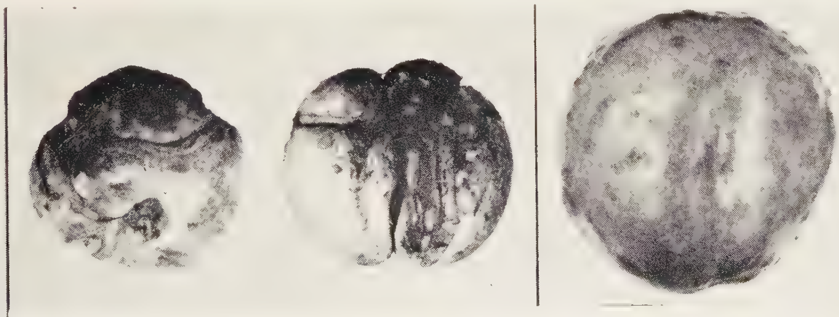
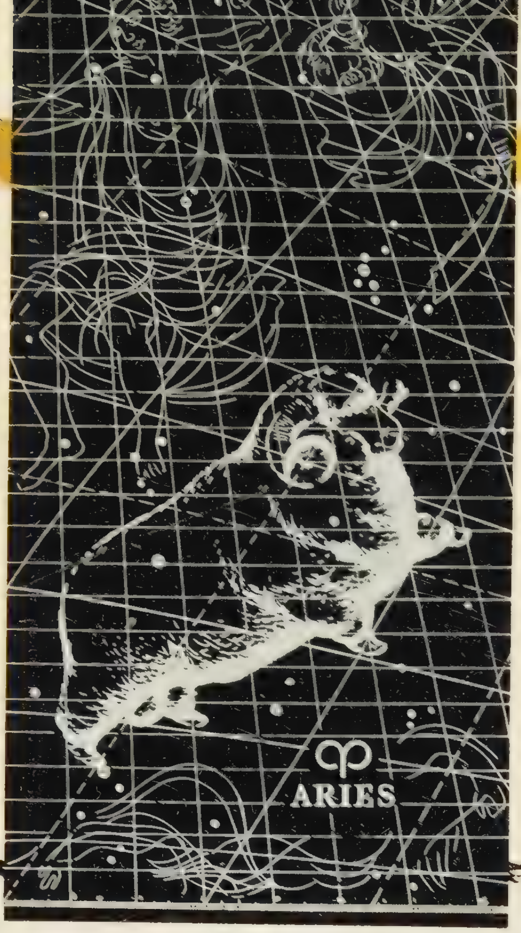


Fig. 1—Severe fruit symptoms of Goldmine nectarine (left) and Cardinal nectarine (centre). Mild fruit spotting of Hunt's Tawny nectarine (right).



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spotting of the leaf (Fig. 2), and often some distortion. In addition to nectarines many peach varieties show similar leaf symptoms, though no fruit symptoms occur. However, fruit symptoms (Fig. 3) of possible insect origin have been observed in association with leaf spotting and this point should be kept in mind when similar problems occur in the future.

After early work on the possibility of trace element deficiency, mainly boron, the possibility of its being of virus origin was investigated, but these trials were negative. Consideration was given to insect attack and suggestions were made to growers to try nicotine sulphate. Last season, though no definite insect was suspected, a trial was laid down on one of the worst affected blocks of Hunt's Tawny. Two newer insecticides were used, the organo phosphorus compound methyldemeton and endrin, applied at the petal fall stage. Results on this trial were inconclusive, but though differences between treatments were not significant, there seemed to be some benefit from the spray treatments.

The trial was repeated in the spring of 1958 with the same materials, methyldemeton at 1 pint in 100 gallons and endrin at 1 quart in 100 gallons, applied at pink and petal fall. There was a very definite response. Trees in both treatments were almost completely free from leaf and fruit symptoms, while adjacent untreated trees were severely affected, some to such an extent that no salable fruit was produced (Fig. 4).

Leaves from affected trees sent to Plant Diseases Division, Department of Scientific and Industrial Research, were found to be infested with the peach silver mite (*Vasates cornutus* (Banks)) of the family eriophyidae, which was considered by Plant Diseases Division to be responsible for the yellow spots on the leaves, though it was doubted if they were also responsible for the fruit symptoms. Thus the possibility of some other insect also being associated with this problem cannot yet be entirely eliminated.

According to Plant Diseases Division the mites move from the leaves to leaf and fruit buds in early autumn and overwinter there. Thus there is a good argument for post-harvest and dormant sprays of lime sulphur or wettable sulphur, as sulphur is generally very toxic to eriophyids.

The increasing incidence of leaf spotting in this district may be partly because sulphur sprays for the control of fungous diseases are no longer common practice with peach and nectarine growers.

At the suggestion of Plant Diseases Division trial work is being extended this season to include some less expensive and less dangerous materials such as sulphurs and butylphenoxyisopropyl chloroethyl sulphite ("Aramite"). Proposed treatments are:

FRUIT INJURY TO NECTARINE AND PEACH

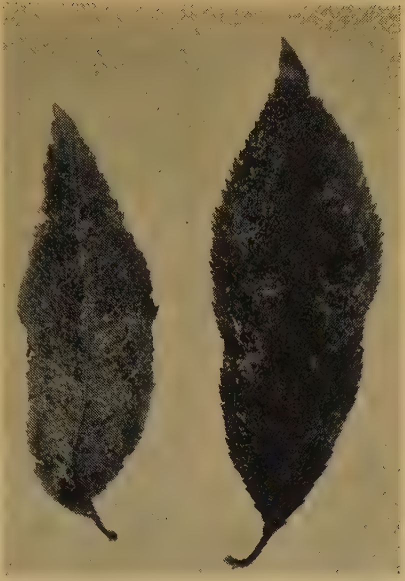


Fig. 2—Yellow leaf spotting of Briggs Red May peach.

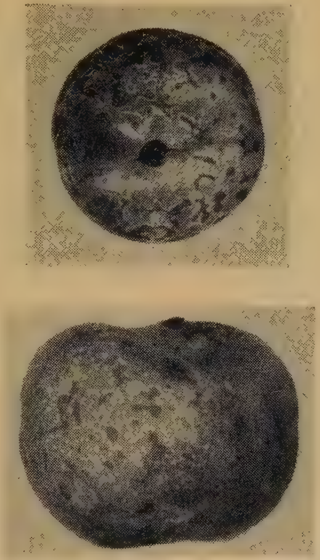


Fig. 3—Fruit markings associated with yellow leaf spotting on Hales Early peach.

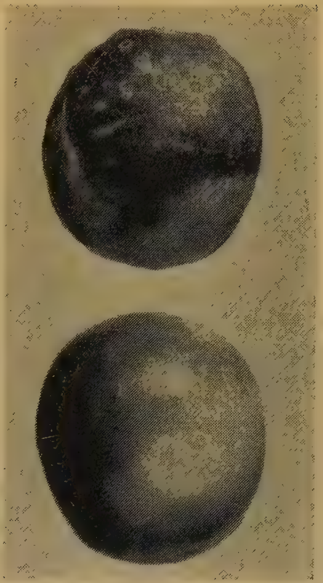
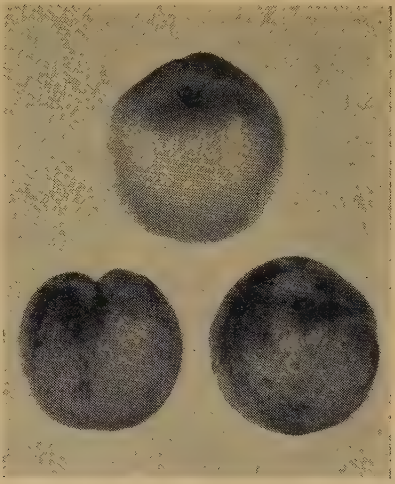


Fig. 4—Contrast in fruit between sprayed and unsprayed nectarines. Above the variety is Hunt's Tawny and below it is Goldmine.



- Lime sulphur in late autumn.
- Lime sulphur in late autumn and winter (dormant).

- Lime sulphur in winter (dormant).
- Wettable sulphur at pink and petal fall.

- "Aramite" at pink and petal fall.
- Methyldemeton at pink and petal fall.

- Endrin at pink and petal fall.

In addition specimens of any other insects which may be associated with this problem will be sought.

Any nectarine and peach grower who has been troubled with similar fruit or leaf symptoms and contemplates trying any of the suggested treatments is asked to get in touch with the local Horticultural Instructor so that information on the effectiveness of the treatment can be recorded.

Black and white photos by Department of Scientific and Industrial Research.

Care of Livestock during December

[National Publicity

Contributed by the Animal Research Division

DAIRY COW NUTRITION

THE year's production can be materially affected by feed conditions during summer. Cows fed poorly now not only produce less milk during summer, but will dry off earlier in autumn. Dairy statistics show that long lactation is very important, so the feeding of silage or other supplementary milk-producing fodders should be started as soon as pasture begins to dry off. This should not be left until milk production shows a material fall.

CARE OF EWES AND FAT LAMBS

As each lot of lambs is sold their mothers and any dry ewes that may remain in the flock should be drafted off. If feed is short and the ewes have very little milk, it usually pays to wean all the lambs, which can then be given the best grazing available. The ewes should be shorn and those which are to be retained should be placed on short pasture with ample water until flushing is started three weeks before tupping. This will help to reduce their condition and will result in a better lambing percentage in the following season.

SHEARING

If ewes with lambs are to be shorn, every effort must be made to reduce the time during which lambs are away from the ewes, as it is easy to dry ewes off at this time of the year. They should be brought to the shed in small mobs and should be dagged before reaching the board.

FOOT ROT CAN BE ERADICATED

This is the season in which plans for the eradication of foot rot must be made and farmers should follow the recommendations in Bulletin No. 325, "Foot Rot in Sheep Can be Eradicated".

PIG PRODUCTION

Farrowed sows should receive a ration of 4 gallons of milk plus 2/3 gallon per pig suckled. Newly weaned pigs should not be overfed; 1½ to 2 gallons per day in three feeds is adequate for the first 14 days. The ration can then be slowly raised to 2½ gallons at the end of the first month, and after the first fortnight the number of feeds may be reduced to two per day.

Replacement breeding stock should be selected from the bacon pens. Those chosen should be the fastest growing sows with good strong feet and at least 12 well placed teats.

COWS RETURNING TO THE BULL

If cows are returning to service, the mating records should be examined to see if any particular bull is to blame. If so, a veterinarian or Livestock Instructor should collect a semen sample for examination. Care is necessary when a replacement bull is bought, and if possible, it should be a young bull that has not been used previously. A bull should never be bought in the saleyard unless his full history is known. Washing out cows seldom helps and may cause trouble if irritant fluids such as kerosene are used. It pays to consult a veterinarian as soon as the cows are noticed returning to service in unusual numbers; he cannot be expected to diagnose the trouble months later.

LEPTOSPIROSIS IN CATTLE

Infection with *Leptospira pomona* can cause abortion in cattle and redwater in calves. Both of these diseases may be prevented by vaccination of the pregnant cow. Cows vaccinated early in pregnancy and again about two to four weeks before calving may be protected against this particular type of abortion and at the same time protection may be given to the calf against redwater through the colostrum. A veterinary surgeon should be consulted to establish a diagnosis of leptospirosis and to undertake control measures.

Crop and Pasture Production

Seasonal Notes by the Farm Advisory Division

LUCERNE SEED CROP CLIMATE and locality appear to have more influence than management on lucerne seed production. Districts with a warm, dry climate and hot, dry winds during the pollination period seem to be the most favoured. In addition the crop requires adequate moisture during flowering to secure good seed setting.

If early spring growth is to be obtained, winter grazing and especially late winter grazing should be avoided. A hay crop is first taken and then the area is shut up for seed. Some growers take two light crops of hay, but the normal time for shutting up for seed is during November.

Older stands are better for seed than young stands, which are normally too vigorous and dense and make too much growth, which interferes with seed setting and also makes harvesting difficult. Some of the best yields have come from stands that had practically run out and were ready for ploughing.

The crop is usually ready for harvesting in late autumn. Normally the crop is ready to cut when 75 per cent of the seed pods have turned dark brown. It is cut with the mower and then threshed from the swath with the header harvester with pick-up attachment. In crops where conditioning is difficult a general practice is to turn the swath or lift it with the aerator, doing only as much as can be threshed the same day. Where crops are late or harvesting is hampered by weather or too much leafy growth, the best method is to spray with a defoliant and direct head.

—R. G. JOLLY, Christchurch

* * *

LUCERNE-GRASS MIXTURES MANY combinations of lucerne-grass mixtures have been tried, but cocksfoot appears to be the most suitable companion grass under the conditions which favour the use of lucerne as a pasture plant.

The seeding rate of cocksfoot must be light and 2 lb per acre should be the maximum, and even this would dominate the lucerne if allowed to seed regularly, so grazing should be sufficiently severe to prevent heavy seeding.

Other grasses such as timothy may be worth considering under higher-rainfall conditions, but the need for lucerne as a pasture plant is not the same where ryegrasses and clovers are the basis of pasture production. Often, however, districts with a high annual rainfall are subject to droughts and the use of lucerne-grass mixtures for this critical period may be worth considering for hay and pasture use.

—W. A. LUNN, Ranfurly

* * *

CONTROL OF RUSHES OF the rush species which commonly infest pastures the most readily killed by hormone preparations is the soft rush *Juncus effusus*. It is more readily eaten by stock than the harder-stemmed, more wiry species and thus it can generally be killed by spraying without prior cutting.

Other species of rush, such as the common *J. polyanthemos*, should be cut and the regrowth sprayed, usually about two months later. Sufficient regrowth to absorb the spray should be allowed, but spraying must be done before the stems become hard with the onset of dry weather. Rushes cut in early spring can be sprayed in early summer, when regrowth will have reached 1 to 2 ft high, depending on the species.

The hormone preparations which have given the most satisfactory results are the emulsifiable esters of 2,4-D at 2 lb acid equivalent per acre. Rushes are difficult to wet and an atomised spray should be used in calm weather to avoid excessive spray drift.

Rushes are chiefly a weed of damp places, though they are not confined to these. Chemical removal of rushes could be of little avail if nothing was done to correct the conditions responsible for their presence. If by drainage or soil fertility improvement the vigour of pasture species can be increased, the likelihood of early reinfestation will be greatly reduced.

Close grazing appears to favour the spread of rushes so that cattle grazing or taking of periodic hay cuts could help to restrict their spread. As in most aspects of weed control spraying should be an aid to good management and not a substitute for it.

—W. F. LEONARD, Christchurch

* * *

PASPALUM SILAGE DAIRY farmers in the warmer districts of the Auckland Province frequently find surplus paspalum growth an embarrassment during a wet summer and autumn. Though paspalum has a fairly high fibre content compared with species such as short-rotation ryegrass, it can be made into good silage if precautions are taken. The area to be closed for silage should be topped during December or early January to ensure an even crop of good leafy herbage.

The crop should be cut at a height of 12 to 18 in., when there will be maximum bulk and reasonable quality. If the crop is left to get mature and stalky, its feeding value is virtually nil and it cannot be made into good silage. If soil fertility is satisfactory, there will be a reasonable clover content in the cut material. The crop should be harvested without delay, and no more should be cut than can be handled in a day. If the weather is particularly hot cut in the morning only sufficient to be carted in up to lunch time, and then cut another lot for the afternoon. Never allow the material to wilt and make sure that the green material is well consolidated in the pit or stack to reduce heating to a minimum. With these precautions silage of a high quality can be made from paspalum that will enable good use to be made of fodder that would otherwise be wasted. It is often better to make silage rather than hay from paspalum.

—A. V. ALLO, Tauranga

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By J. E. DUNCAN,
Chief Advisory Officer (Wool),
Department of Agriculture, Wellington

THE last five years have seen a bigger upheaval in dipping methods in New Zealand than all the previous years of our history. The revolution is by no means finished yet, and no one can tell what the end will be. However, the objective remains the same—to achieve the most efficient way of ridding sheep of external parasites.

THE two parties chiefly concerned are the farmer and the dip maker.

FARMER

If possible, he wants his sheep freed of parasites and protected against reinfestation for the maximum period at a reasonable cost. Preferably the operation should be easy, foolproof, and not unpleasant or dangerous to either sheep or men.

MAKER

He also seeks the most efficient material, which should be cheap and easy to manufacture, deadly to parasites but innocuous to sheep and men, foolproof, and easy to use.

If these ideals could be realised, there would be no problems, but because they cannot, maker and user must collaborate to get the best results. That is why the labels on dipping materials at times appear complicated or on the longside to ensure that dips are used as safely and efficiently as possible. The maker knows the nature and performance of his product better than the user. The farmer ignores the instructions at his own risk.

Though the modern insecticides are infinitely more potent against parasites, they are not nearly as poisonous to warm-blooded animals as the old arsenical dips. In those days there was an uncomfortably small margin between killing the parasites and killing the sheep as well. Nevertheless the modern dipping materials cannot be treated entirely with impunity, and many of the directions on the label are designed to avoid any remaining risk of poisoning. The others are mainly to ensure that the dipping material is mixed at the correct strength for best results, that the sheep are handled in a reasonable manner, that the dip is applied as effectively as possible, and that sundry other conditions are as favourable as possible. These directions can be considered under the following headings:

POISONING

Sheep may be poisoned by swallowing an arsenical dip or by absorbing it through cuts or even unbroken skin if the dip is overstrength. The modern chlorinated hydrocarbon type dips such as BHC, aldrin, and dieldrin are much less deadly when swallowed, but in concentrated form can quickly be absorbed through the unbroken skin. So can the organic phosphorus compounds such as diazinon and "Delnav". Hence the need for care on the operator's part in handling concentrated materials and for the directions to wear protective clothing, including a mask, when using dusts. That is also the reason behind the direction to remove wet clothes at the first opportunity and to wash off concentrated dip that has come in contact with the skin.

The labels usually carry warnings against less obvious forms of poisoning, such as calves chewing empty arsenical dip packets and fish being killed by running used dip into a stream.

MIXING

Directions for mixing are generally very clearly set out and must be faithfully followed for best results. In the old days dips were mixed pretty well in a standard way to deal only with lice and keds. Now they can be mixed at various concentrations according to how they are to be applied (for example, by plunge, shower, or tip spray) and to whether prolonged protection against fly strike is desired beside killing keds and lice. Tip spraying machines vary widely in their outputs, pressures, patterns of nozzles, and physical construction, and the concentration must match these characteristics.

STRIPPING OR EXHAUSTION

Part of the arsenic in the old dips was in true solution and the strength did not progressively fall as dipping continued and the level in the bath fell. Modern dips are suspensions rather than solutions, and the active particles or droplets are progressively removed by the wool of the sheep passing through. This is known as stripping or exhaustion. Hence the need for "replenishing" or "reinforcing" the bath or sump at frequent intervals to keep up the concentration of active ingredients. If this is allowed to fall too far, a complete kill of parasites will not be obtained, and most of the expense, time, and trouble of dipping will be wasted.

Replenishment means the raising of the level of the used wash in the bath by addition of both concentrate **and** water, but usually at a higher strength than the original wash in the bath or sump.

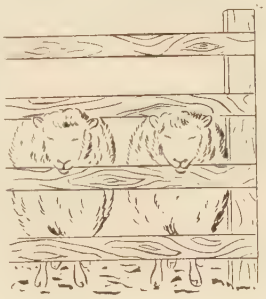
Reinforcement means the adding of concentrate only to the bath without addition of water. Both methods are to compensate for the exhaustion that has taken place, and here again the makers' instructions must be rigidly followed.

One of the advantages of tip spraying is the avoidance of stripping, because no fluid is returned from the sheep; it is all fresh and full strength.

CONDITION OF SHEEP

Dipping sheep with open shear cuts is inviting trouble in the form of a potential outbreak of blood poisoning. Nearly all dips now contain bacteriostats to prevent the infection of cuts and scratches, but there are limits to their powers, particularly when the dip is old and dirty. Before bacteriostats came into common use there had been a good deal of trouble with lameness after dipping, which was due to infection of scratches and abrasions of the feet and legs.

Bacteriostats are sometimes omitted from materials to be used in shower dips, and tip sprayers because the dip is not, or should not be, kept long enough for infection to develop. They are not required in dusts. Many dips use copper sulphate (bluestone) as the bacteriostat, and these must not be used in showers or tip sprays, as the copper sulphate would attack the metal; hence the warning on the packet.

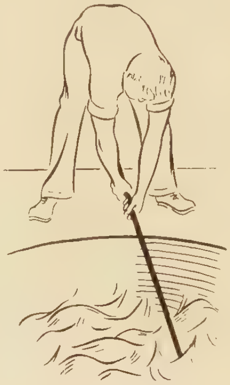


At the other end of the scale, tip spraying and dusting sheep with long wool—over 3 months' growth—are frowned on by the makers and not allowed under the Stock Act, as results are likely to be disappointing.

Warnings are given against driving sheep for any distance immediately before or after dipping as a precaution against their heating up and possibly absorbing enough dip to harm them. Dipping in extreme heat is similarly unwise and warned against.

BREAKDOWN OF DIP

Arsenical dips could and did work when they were very old and very dirty; what they did to fleeces and wool values was another matter. Modern dips will not stand this sort of treatment; the actual ingredients are liable to decompose if the dip is kept too long in a dirty state. The makers warn against this and also storing the dip under extreme conditions of heat and cold, again due to the risk of breakdown or separation of ingredients.



Some dips will not mix satisfactorily with hard water; if so, the containers bear a plain warning. Dips badly mixed can stain wool and endanger the health and lives of sheep.

With all dips, even the old arsenical powder types, emphasis has always been placed on complete mixing and constant agitation to keep the ingredients mixed so that every sheep gets its share of active ingredient.

GENERAL

The basic requirement that **every** sheep on the property should be dipped holds today as it has always done. With modern equipment such as tip sprayers it is little trouble to deal with stragglers or with bought-in sheep after the main dipping or even to dip the whole flock twice a year if necessary.

With plunge dipping the recommended time of immersion was at least a minute, and with power sprays or showers it was several minutes, the aim being to achieve complete wetting all over and down to the skin. With surface methods of application it is quite impracticable to give a time limit, and complete wetting is no longer required, thanks to the wonderful ability of modern insecticides to migrate or transfuse down the wool to skin level. What is still required, however, is complete coverage, and enough of the dip remaining in the wool and eventually reaching the skin to do the job.

The latest insecticides are near-miracles of potency against parasites. Users should not unreasonably expect them to perform 100 per cent efficiently if they are abused by disregard of instructions and by attempts to break records in speed of dipping.

RECENT TESTS AGAIN CONFIRM VALUE OF COBALT BULLETS

'No deaths'

'Notable weight gains'

'Greater economy of treatment'

OFFICIAL NEW ZEALAND TRIAL

Three groups of cobalt deficient lambs about 4 months of age were used in the Test. One group received no treatment, a second group received weekly doses of cobalt and the third group received cobalt bullets. All lambs were weighed at weekly intervals. This table records the results. Note that 7 lambs died in the untreated group during the duration of trial.

GROUP	NUMBER OF LAMBS	DEATHS	AVERAGE WEIGHT CHANGE	AVERAGE CARCASE WEIGHT
A—Untreated	22	7	— 7 lbs.	24
B—Cobalt dosed	12	nil	+ 23 lbs.	38
C—Cobalt bullet	10	nil	+ 24 lbs.	38

The report shows that cobalt dosing in one form or another, reduces deaths and produces good weight gains. The advantages of 'PERMACO' cobalt bullets over other methods, however, is that they are easily given, with as little trouble as a drench; and once given, supply essential cobalt over a long period with absolute certainty of cobalt intake. Repeated treatments are not necessary, and 90% of sheep respond to the first treatment. The ease, duration and certainty of 'PERMACO' bullets put them out on their own. To quote the report ". . . . if cobalt deficiency is suspected its presence or absence can be confirmed using only a set of scales and about 20 shillings worth of cobalt bullets."

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Tip Spraying of Sheep for Parasite Control

By L. K. WHITTEN,
Parasitologist,
Department of Agriculture
Animal Research Station,
Wallaceville

TIP spraying of sheep for the control of keds and lice is a recent development which has become very popular with New Zealand sheep farmers. The success of the procedure depends on the deposition of enough insecticide on the fleece in such a way that it comes into contact, sooner or later, with all the parasites present. It should persist in the wool for long enough to give a complete kill of the next generation of parasites hatching out from eggs or pupae.

IT is clear that tip spraying cannot give complete saturation of the fleece and therefore it is suitable only for use with insecticides that possess the property of diffusing down the wool fibre and spreading in that way throughout the fleece. Only three insecticides in common use at present diffuse sufficiently rapidly to justify their use in surface application. These are dieldrin, aldrin, and diazinon. The concentration of the insecticide in the spray fluid used for surface application is much greater than that used in plunge dipping or saturation spraying.

Speed of Sheep Passing through Spray

A large number of factors can influence the amount of wash that is deposited on the sheep. One of the most important is one over which we have only limited control—the speed at which the sheep passes through the chute. Observations at Wallaceville have shown that sheep from the same pen may travel at rates from 1 ft per second to 7 ft per second and that between three and four times as much fluid is deposited on the slowest as on the fastest moving sheep.

An adequate amount of insecticide must be deposited on the sheep that moves most rapidly through the spray, and naturally all other sheep will receive more than they require. Recommendations for dilution are based on this requirement.

Space between Sheep

Another important factor in determination of the amount of wash wasted is the space between successive sheep. When sheep are running head to tail less wash will obviously be wasted than if there is room for another sheep or two between them.

Pressure

When the pressure falls below the recommended one, owing to a faulty gauge, reduced pump revolutions, or to blockages, the amount of fluid deposited is reduced. The reduction in deposit is much less than that due to speed differences. In one test a machine running at half pressure still deposited only 30 per cent less fluid per sheep.

Length of Wool

Length of wool has an important bearing on the amount deposited per sheep. A sheep with 3½ in. of wool retained twice as much fluid as one with only ½ in. of wool. But if one considers the amount of insecticide deposited per pound of wool instead of the amount retained per sheep, the situation is entirely different. The sheep with ½ in. of wool retained four times as much insecticide per pound of wool as did the one with 3½ in.

This point is a very significant one, as it serves to stress the importance of using tip spraying methods when the wool is as short as possible.

Under these conditions, complete parasite control is much more likely to be achieved than when the wool is longer.

Factors Governing Efficient Operation

Efficient operation in tip spraying depends on the following factors:

1. **Pressure.** Recommended pressures should be maintained throughout. Motors, pumps, and gauges should be checked regularly. The water supply should be clean and nozzles should be watched closely for signs of blocking.

2. **Concentration.** The manufacturer's recommendations should be followed in every detail, and dilutions should be made accurately.

3. **Wool length.** Spraying should be done with the wool as short as possible and, in any case, not later than three months after shearing.

4. **Speed.** The chute should be set up so that the sheep run through it without interruption and at the fastest possible rate. If necessary, provide drainage to prevent the accumulation of surface liquid in the yards which may cause sheep to baulk.

All sheep must be properly treated. Failure to do this might necessitate re-treatment of the entire flock later.

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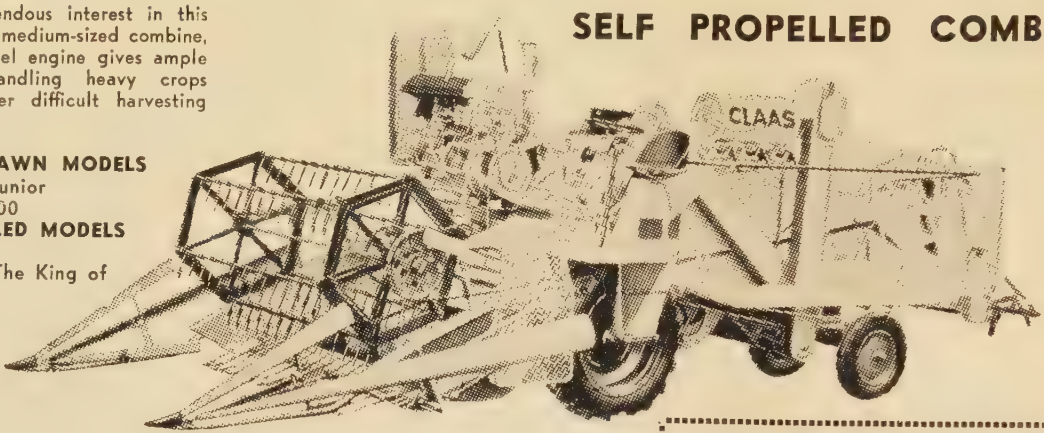

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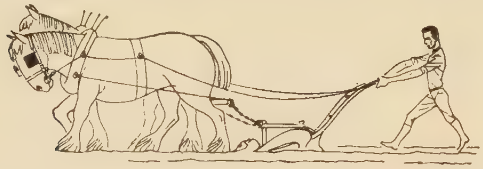

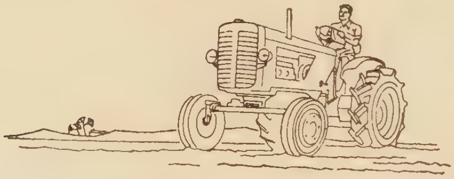

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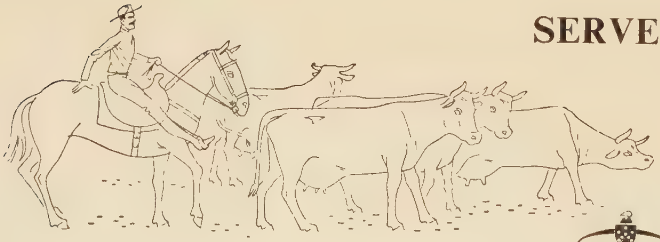

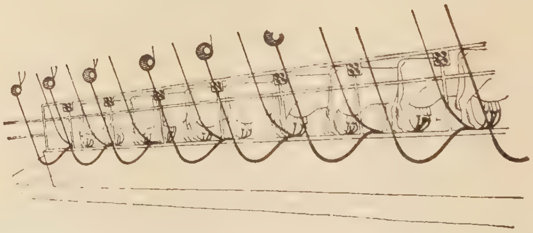

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Trace Mineral Deficiencies and Current Stock Health Investigations

FOR some years deficiencies of three trace elements, cobalt, copper, and iodine, have played a relatively important role in animal health in parts of New Zealand. More recently evidence has been found of a probable soil deficiency of a further trace element, selenium. Incidence, symptoms, and control of these deficiencies and intensive research into the possibility of the use of selenium in the control of white muscle disease, ill thrift, and the barren ewe problem associated with white muscle disease were discussed in a paper, an adaptation of which follows, given by I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin, to the second annual Invermay Farmers' Conference at Mosgiel this year.

COBALT

SEVERE cobalt deficiency causes relatively rapid loss of condition and death in young sheep and cattle. Severely cobalt deficient areas are now known and preventive management practices are adopted in them.

The main problem today is borderline or slight cobalt deficiency, which can be difficult to diagnose and requires careful investigation. **In general this borderline deficiency shows itself by lambs not thriving after weaning.** Frequently there are no spectacular death rates or symptoms.

There are two reliable methods of diagnosis. A liver from a typically affected lamb may be examined for the presence in normal amounts of vitamin B_{12} (cobalt deficiency is in fact vitamin B_{12} deficiency), or a cobalt dosing trial may be carried out.

Farm Dosing Trial

The method chosen in most circumstances is a **cobalt dosing trial.** Draft off 50 or 60 of the tail-end lambs and sort them into two groups at random. Eartag each lamb, weigh and record individual weights, and administer cobalt to one group only. Keep both groups under identical conditions and finally weigh each lamb at the conclusion of the trial; that is, at one to three months old.

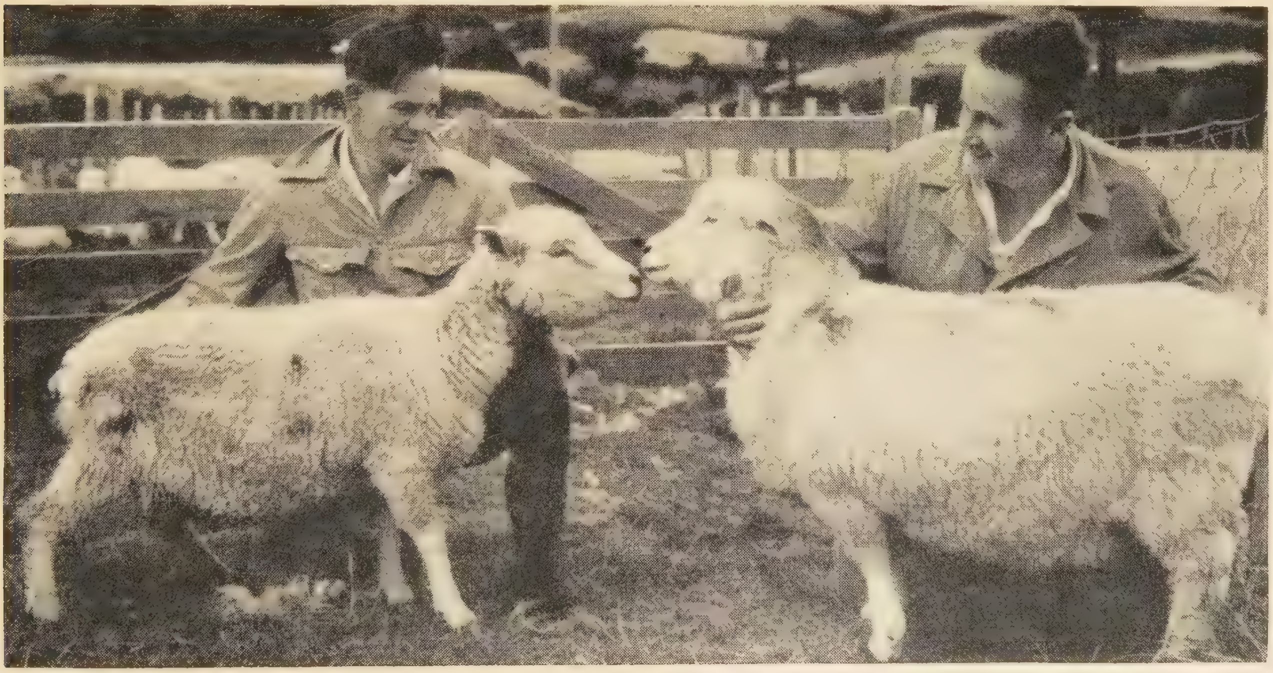
If cobalt is deficient, there will be a significant difference in weight in favour of the cobalt group; this difference is frequently not apparent without weighing.

The ideal method of supplying cobalt for these trials is by a cobalt bullet administered to the appropriate group of lambs at the commencement. If drenching is used, it must be done weekly.

Farmers suspecting cobalt deficiency should consult officers of the Department, as such aids as soil survey maps and the knowledge of specialist staff are useful in interpretation of cobalt trials. The deficiency may vary from year to year and trials may have to be repeated.

On farms which are topdressed, **cobalt deficiency is best remedied by using cobaltised superphosphate**, which is made by most fertiliser works.

Where topdressing is not done cobalt bullets or licks containing adequate cobalt may be used. Licks have disadvantages. Another satisfactory



Obvious difference in weight gain between undosed (left) and dosed (right) lambs kept under otherwise identical conditions in a cobalt dosing trial by Wallaceville Animal Research Station.

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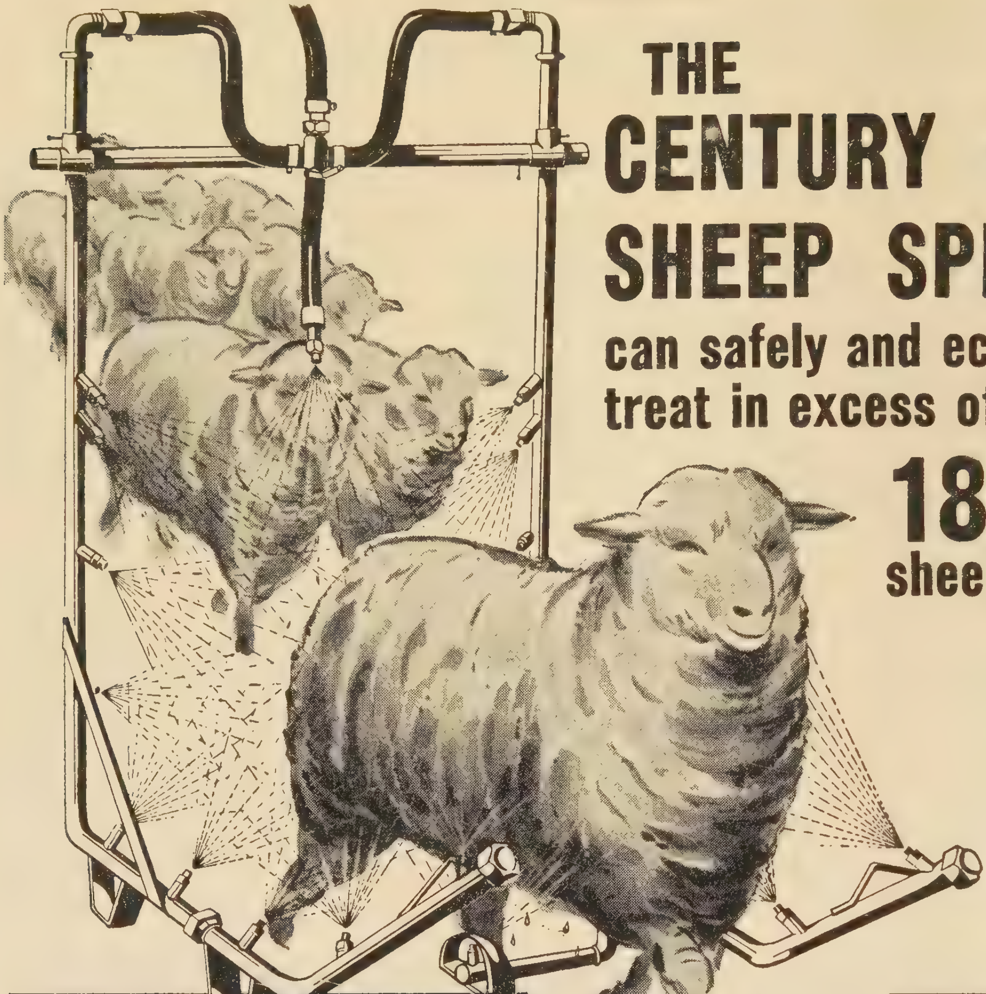

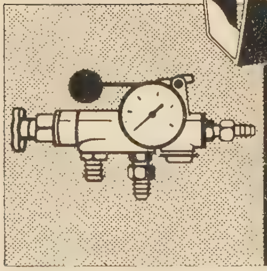

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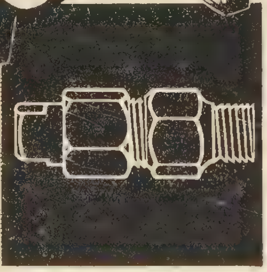

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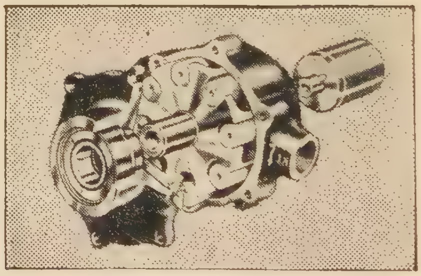

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THE CENTURY HOLTON Sheep Sprayer high pressure unit operates at 150 lbs. P.S.I. applying 265 gallons per hour through 20 specially designed nozzles. This high pressure ensures maximum coverage for the control of lice, keds and blowfly, and when using Dieldrin and Aldrin in the correct manner, is recognised by the N.Z. Department of Agriculture as complying with the Stock Act 1908 (amended 1947), as a legal method of dipping. The sprayer and pump can fit into the boot of a car. The complete unit can also easily be carried by one man and can be erected in a few minutes.

THE PUMPING UNIT. The sheep sprayer operates with a high pressure Hypro N7500 nylon roller pump at a pressure of 150 ibs. P.S.I. The pump unit may be coupled direct to a tractor power take off, or driven by an independent petrol engine, thus making the unit ideal for field use.

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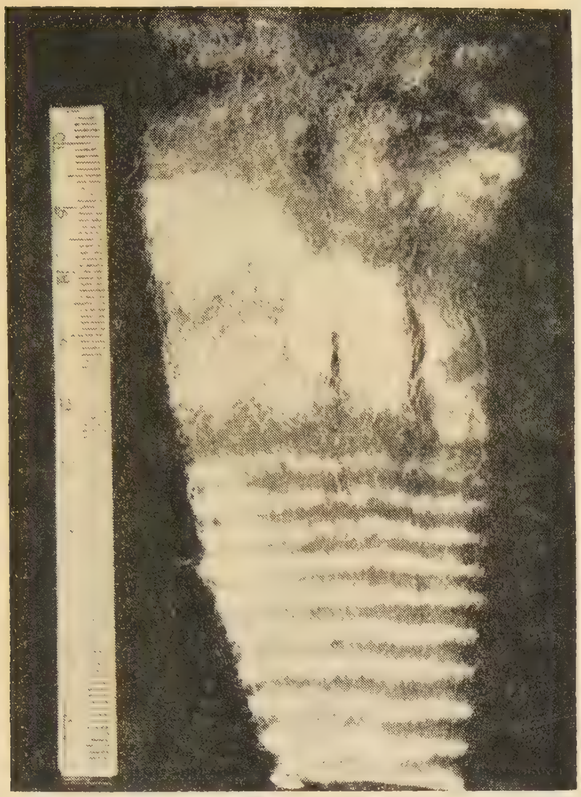

← Steely appearance and complete loss of crimp characteristic of the wool of half-bred and Merino sheep run on copper deficient country.

General Features of Deficiencies of Trace Mineral Elements

Deficiencies of various trace elements are frequently related to particular soil types. By the use of proper diagnostic methods it is possible to prove the existence of a deficiency. *It is always preferable to have a thorough investigation made before applying minerals.*

alternative is spraying pastures with a cobalt solution.

IODINE

Iodine deficiency causes goitre in sheep, cattle, and pigs. It is relatively common, particularly in river valleys.

The deficiency effect most commonly seen is **congenital goitre in young lambs, a percentage of lambs being born dead or dying within a few days of birth.**

In severe cases the dead lambs may not be properly covered with wool. Thyroid glands are generally enlarged, shown by swelling about the throat.

Goitre may occur in two ways; it may be due to soil deficiency of iodine or by feeding ewes during pregnancy on crops such as brassicas which interfere with the use of iodine by the animal. Both types of goitre are readily prevented by giving iodine to pregnant ewes. If this is done by licks, they should contain potassium iodate, which does not deteriorate when put out. Licks containing potassium iodide must be renewed every week or so.

The best method of supplying iodine is to drench the ewes with potassium iodide two months before lambing and again one month later. When this is done all ewes get sufficient iodine.

COPPER AND MOLYBDENUM

Copper deficiency also occurs on particular soil types. Peaty and sandy soils are always suspect; some river and marine silts may also cause trouble. On other soils a slight copper deficiency may be accentuated by a high level of molybdenum in the pasture, which causes further loss of the already low copper supply in the animal.

Some lambs from copper deficient ewes show brittleness of bones and swayback, a type of paralysis of the hindquarters. Merino and half-bred sheep run on copper deficient country show **steely wool**, which has a characteristic appearance with all crimp lost.

Copper deficiency in calves causes unthriftiness, brittleness of bones, and loss of coat colour. Copper deficiency associated with excess molybdenum causes unthriftiness in dairy cattle, severe scouring, and loss of coat colour.

The scouring occurs with the flush of spring grass.

This type of copper deficiency frequently does not show in such a spectacular manner with sheep. There may be a few cases of swayback in lambs or merely unthriftiness.

Diagnosis of copper deficiency may be confirmed by chemical analysis of livers or by a copper dosing trial carried out in a similar way to the cobalt trial.

Copper deficiencies are best corrected by topdressing with bluestone (copper sulphate) at 5 lb per acre or copperised superphosphate. Another satisfactory method is by the use of copper cerate injections, which are also useful for trials.

Copperised licks have the disadvantage common to all licks that not all stock take them.

Copper poisoning can readily be caused by excessive concentrations of topdressing or licks.

SELENIUM

Many farmers will be aware that in recent research the mineral **selenium has given most promising results in the prevention of white muscle disease in lambs** and has also caused **an increased growth rate in lambs** on some properties where trials have been conducted.

White muscle disease has shown up in several forms in a number of districts in the South Island. The condition was **first recognised in hoggets** when they were driven to grass after being wintered for several months on turnips; those affected became stiff and "stilty", went down, and died within a few days. Experience has shown that the condition rarely occurs if hoggets can be allowed to wander quietly on to an adjacent crop of green feed for a few days before being driven any distance.

However, the heaviest losses from white muscle disease have occurred in lambs. Some of these losses occur within one or two days of birth and frequently immediately after birth or within an hour or two. In these lambs the heart muscle is affected and before death breathing is rapid and difficult. There is frequently excess fluid in the body cavities.

In older lambs, 3 to 12 weeks of age or more, deaths may occur suddenly due to white muscle heart lesions or several days after the lambs have shown stiffness and become "stilty" and unable to walk. Affected muscle, whether in the heart or in the body or limbs, is white like fish flesh or has white areas in it.

White muscle disease in lambs occurs most frequently on light land which has been developed rapidly. Usually it is seen on paddocks in which lush clover is dominant.

(Continued at bottom of page 437)

THE RIGHT PUMP

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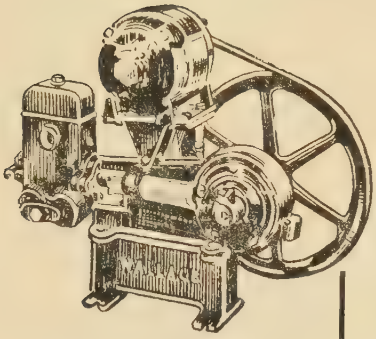

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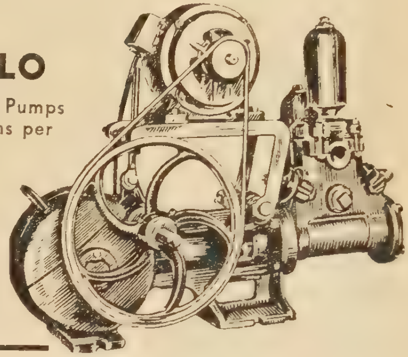

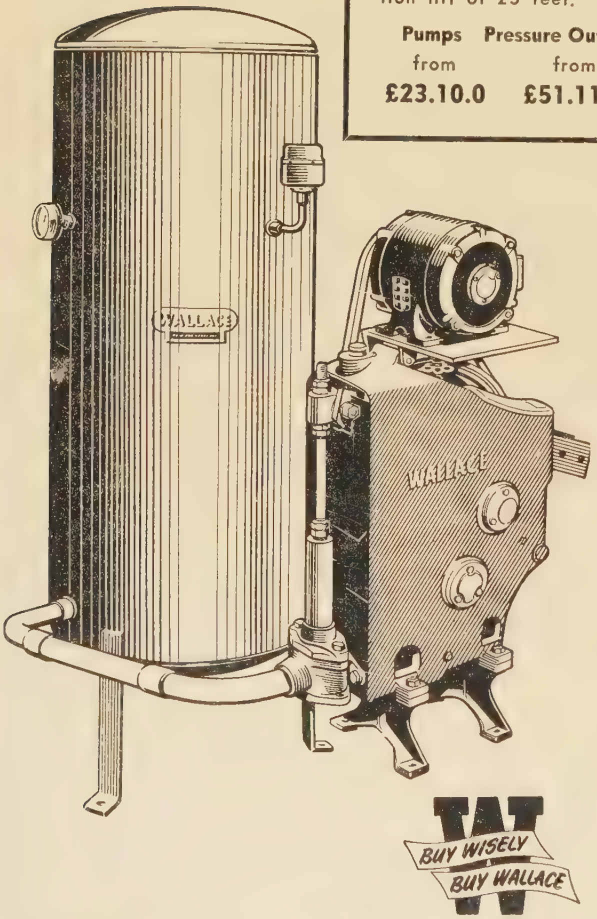

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Covering Silage Clamps with Sawdust

By G. B. HADDOW,
Farm Advisory Officer,
Department of Agriculture,
Auckland

SAWDUST has been used for covering silage clamps by farmers near Whenuapai aerodrome, Auckland, for over six years. Properly used, sawdust eliminates surface wastage of silage, but losses due to leaching and heating still occur.

A SAUCER-SHAPED clamp completely covered with 9 to 12 in. of sawdust immediately after the last load of grass had been spread had no surface wastage when opened a year later. This contrasts with the usual waste of 3 in. under any other type of cover tried.

Advantages of Sawdust

Besides eliminating surface waste of silage, which is rarely less than 20 per cent, sawdust is light and clean to handle. It can be used for more than one season, though fresh sawdust is preferable because it makes a better seal. Waste sawdust remaining after the silage has been fed can be spread without harm to stock or pasture. Sawdust also provides a cover that deters biting flies which breed in early cut, warm, moist silage.

Disadvantages of Sawdust

The farm should be handy to a sawmill to reduce cartage costs. Owing to the shortage of sawdust at local mills during harvesting time it has proved necessary to begin stock piling sawdust in August or September. The sawdust is left in heaps beside pits or the sites of proposed clamps until it is needed. It is most important to cover the silage with plenty of sawdust as soon as the stack is finished; otherwise surface wastage occurs.

Wider use of sawdust is recommended where it can be obtained cheaply and in quantity.

Mineral Deficiencies

(Continued from page 435)

Research with selenium in the United States suggested that it might prove valuable here and trials with it were begun. In carefully controlled trials carried out last season in Otago and Canterbury by the Department of Agriculture the most minute amounts of selenium gave good protection against white muscle disease in lambs.

Many of the farms affected are on similar types of soil and from the evidence it appears possible that on some soils white muscle disease is due to a deficiency of selenium.

A major difficulty in rectifying selenium deficiency is that this substance is highly poisonous, even in relatively small amounts, and there are very great dangers in the misuse of it.

The highly poisonous nature of selenium has been well known for many years in America and Europe, where soils high in selenium cause serious diseases called "blind staggers" and "alkali disease". Pasture containing five parts per million has been proved dangerous.

For this reason selenium should be used only under direction of officers of the Department of Agriculture or veterinarians. A great deal of research remains to be done; for instance, to find whether selenium can be used safely as a pasture topdressing, the rate at which it can be applied, and the uptake by plant and animal tissues.

There is evidence that selenium has in some cases caused a substantial improvement in growth rate of unthrifty lambs. It is possible that it will play an important part in the prevention of some types of ill thrift.

Investigation of the flock histories of properties where white muscle disease has occurred in lambs shows that most of them have an abnormally high percentage of barren ewes—40 to 50 per cent on the worst affected farm. This infertility also may possibly be due to a soil deficiency of selenium. Extensive trials are planned to begin immediately to investigate this problem further.

Serious Losses

The following figures from a group of properties affected with white muscle disease illustrate the very serious loss for which it has been responsible.

Farm	Year	Ewes to rams	Lambs surviving after all losses	Barren ewes
A ..	1957	1,000	330	400
	1958	1,050	527	480
B ..	1957	1,500	800	100
	1958	2,000	540	1,250
C ..	1958	700	350	300
D ..	1958	640	640	140
E ..	1958	800	300	370
F ..	1958	640	100	400
G ..	1958	650	500	150

Severe losses in Otago have occurred on properties with a similar soil type, but trouble has seldom been experienced until a level of development permitting two ewes to the acre has been reached. Most of this land has a history of intensive cereal cropping.

Use of Selenium

The present position with regard to selenium can be summarised as follows:

- It is highly poisonous; it has caused serious stock losses in some countries, even in relatively minute amounts.
- Research carried out in New Zealand recently has shown selenium to be promising for:
  - (a) Prevention of white muscle disease in lambs.
  - (b) Prevention of some types of ill thrift.
- Selenium is being investigated for prevention of the high rate of barren ewes on farms which have experienced white muscle disease.

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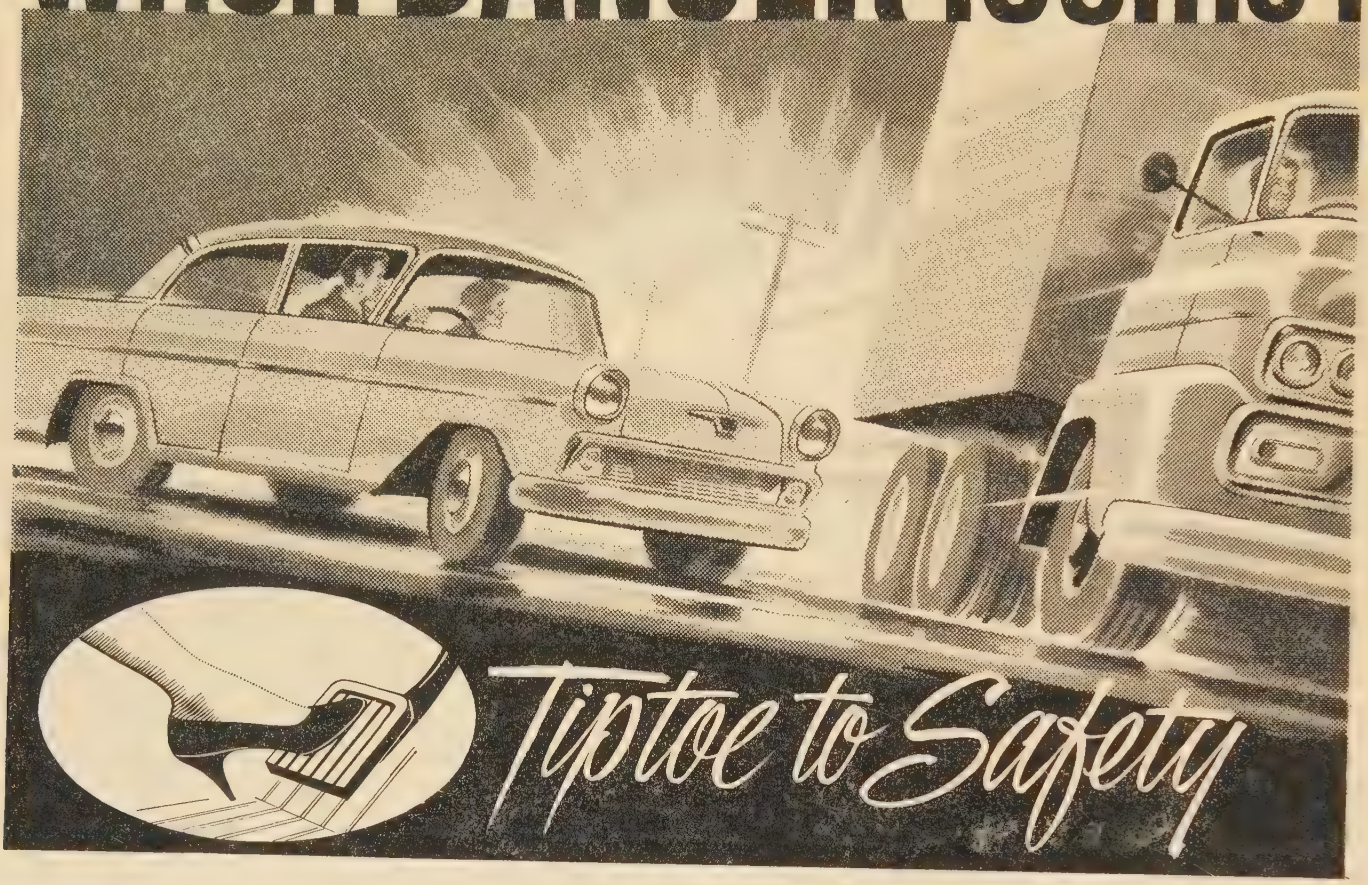

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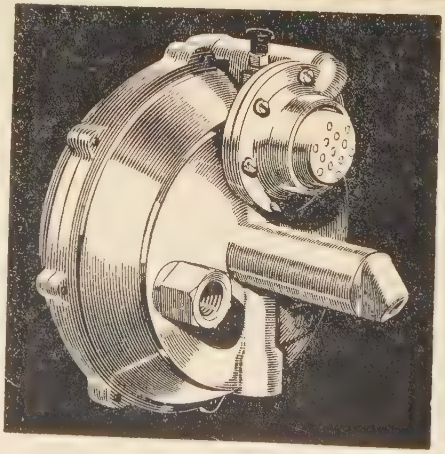

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Survey of Citrus Fruit Growing

By W. A. FLETCHER,
Horticultural Advisory Officer (Citriculture),
Department of Agriculture, Auckland

PRODUCTION of various citrus fruits, plantings, and the market outlook are discussed in this article, which gives results from an orchard survey conducted during the autumn and winter of 1958 by the Horticulture Division. The last similar survey was made in 1953 and some trends then forecast have not developed as expected.

CITRUS orchards with fewer than 50 trees were not included in the survey, though where citrus comprised only part of an orchard the minimum was reduced to 10 trees. The 1958 survey recorded 145,750 citrus trees in commercial orchards, which are virtually all located within the Auckland Province (at Kerikeri, round Auckland City, and at Tauranga, Te Puke, and Gisborne).

The total is about 1,700 fewer than the number recorded in 1953 and is somewhat lower than was expected. The numbers of trees removed from orchards each year since 1953 appears to have been substantially underestimated, though new plantings were assessed fairly accurately.

Planting Trends

Though the change in total numbers of citrus trees over the past five years has been slight, the pattern of plantings has changed markedly. Numbers of lemon trees have declined by 22 per cent and grapefruit trees by 13 per cent whereas sweet orange trees have increased by 30 per cent and mandarin trees by 146 per cent.

Records of new plantings made and trees removed in 1958 after the survey was completed indicate that the above trend is continuing. Of the 5,400 new trees recorded in 1958, 80 per cent were oranges and mandarins and only 12 per cent standard lemons. The remainder were mainly tangelos. About 1,800 trees were removed during the year. These were mainly lemon trees, with a few grapefruit and old orange trees. As for some years past heaviest losses were at Auckland. In the past five years the total number of citrus trees in Auckland has declined 18 per cent. Most trees were removed because they were old or had deteriorated through neglect.

Increases and decreases in numbers of citrus trees recorded during 1958 are shown in Table 1. These figures are additional to the survey records.

Production

The lemon crop in 1958 was lighter than expected, but grapefruit production was back to normal after the exceptionally light crop the previous season. Orange and mandarin production is now beginning to increase as many young trees are beginning to bear.

Estimated production of citrus fruits during the 1958-59 season is shown in Table 2.

Outlook

Grapefruit

Of the 48,600 grapefruit trees recorded 87 per cent were the New Zealand grapefruit variety (including Morrison's and Lippiatt's strains) and 13 per cent were Wheeny grapefruit.

Unsatisfactory prices for grapefruit over recent years have led to some neglect of many trees, which has lowered the production potential for these fruits. The proportion of New Zealand grapefruit trees in A grade condition (vigorous, healthy trees for the district) fell from 79 per cent recorded in 1953 to 65 per cent in 1958 and of Wheeny grapefruit from 89 to 66 per cent. This lowering of production potential has been aggravated by the overall decrease in numbers of grapefruit trees, with few new plantings over the past five years. As a

TABLE 1—CITRUS TREES PLANTED AND REMOVED DURING 1958

	Kerikeri	Auckland	Bay of Plenty	Gisborne	Total
			PLANTED		
N.Z. grapefruit ..	—	—	50	—	50
Wheeny grapefruit ..	—	—	10	—	10
Standard lemons ..	—	—	260	410	670
Meyer lemons ..	—	—	—	—	—
Sweet oranges ..	1,050	—	870	540	2,460
Mandarins	1,190	50	290	260	1,790
Tangelos	360	—	—	30	390
Totals	2,600	50	1,480	1,240	5,370
			REMOVED		
N.Z. grapefruit ..	—	150	30	60	240
Wheeny grapefruit ..	—	—	—	60	60
Standard lemons ..	60	460	250	30	800
Meyer lemons ..	220	30	130	40	420
Sweet oranges ..	150	—	—	150	300
Mandarins	—	—	—	—	—
Tangelos	—	—	—	—	—
Totals	430	640	410	340	1,820

TABLE 2—ESTIMATED PRODUCTION OF CITRUS FRUITS DURING 1958-59 SEASON

	Kerikeri	Auckland	Bay of Plenty	Gisborne	Total
	Standard cases (approximately 40 lb)				
Grapefruit:					
N.Z.	13,000	72,000	38,000	1,500	124,500
Wheeny ..	2,500	1,600	900	1,000	6,000
Total	15,500	73,600	38,900	2,500	130,500
Lemons:					
Standard ..	2,000	7,400	49,000	11,700	70,100
Meyer	8,600	800	5,000	4,500	18,900
Total	10,600	8,200	54,000	16,200	89,000
Sweet oranges ..	6,000	1,200	3,000	4,600	14,800
Mandarins ..	1,000	1,100	900	150	3,150
Other citrus ..	200	—	—	50	250
Total citrus ..	33,300	84,100	96,800	23,500	237,700

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result the steep rises in production predicted after the 1953 survey are now not likely to occur and yields are expected to remain static or increase slightly over the next few years.

Present production of grapefruit appears to be adequate to satisfy demand during the season.

Lemons

Of the 41,200 lemon trees recorded, 43 per cent were Eureka types (including Villa Franca and Genoa varieties), 27 per cent were Lisbon, and 30 per cent were Meyer.

Despite the decrease in numbers of lemon trees since 1953, production is likely to increase in the next five years to about 120,000 cases as a result of increasing yields from the large proportion of trees under 10 years old growing in the Bay of Plenty and at Gisborne.

More than half of the 25,900 standard lemon (Eureka and Lisbon types) trees recorded are in the Bay of Plenty. Production of these fruits at Tauranga (9,400 trees) could increase by 15 per cent to about 46,000 cases and at Te Puke (5,200 trees) by 30 per cent to about 26,000 cases. At Gisborne production of standard lemons could increase by 40 per cent to about 16,000 cases. On the other hand, production at Kerikeri is likely to decline to about 1,500 cases and at Auckland to about 5,000 cases as tree numbers and condition decline.

One third of the 12,400 Meyer lemon trees are at Kerikeri and an equal number are at Tauranga. Many of the remaining trees are at Gisborne. Production of these fruits at Kerikeri and Auckland is likely to remain more or less static at about 9,000 cases and 1,000 cases respectively, but in the Bay of Plenty, where there is a higher proportion of young trees, production could increase by 7 or 8 per cent to about 9,000 cases. Similarly at Gisborne production could increase by 17 per cent to about 6,000 cases.

With better maintenance in many orchards, potential production of all lemons could undoubtedly be increased, but dissatisfaction with returns for Meyer lemons particularly has led many growers to neglect their trees and the proportion of A grade trees has fallen from 83 per cent in 1953 to 63 per cent in 1958. The overall condition of standard lemon trees has not changed over the past five years, but though young blocks are being well maintained, many older orchards are being neglected and the proportion of A grade trees is only 59 per cent.

Since 1953 the rate of planting new lemon trees appears to have been somewhat better than was estimated and has averaged about 1,000 trees per year. If this rate of planting continues, annual production should be maintained at the level of about 120,000 cases to be expected within the next five years. However, about 25,000 cases of this potential production are likely to be Meyer lemons and the seasonal bearing habit of this variety will continue to cause marketing difficulties, with summer shortages and winter excesses.

All new lemon plantings should therefore be standard varieties to ensure even supply throughout the year.

Sweet Oranges

Sweet orange trees were recorded under three headings:

Navel oranges, including Washington Navel and all its derivatives such as Carter Navel, Leng Navel, and Robertson Navel.

Valencia (and Lue Gim Gong).

Other oranges, including Best's Seedless, Omana Jaffa, Harwood Late, and several others.

The total number of orange trees recorded was 40,600. Of these 45 per cent were up to five years old and 69 per cent were up to 10 years old, so that production could increase by more than 200 per cent as trees mature.

New Zealand's climate is marginal for growing oranges and though it remains to be demonstrated that they can be produced economically on a large scale in this country, at a conservative estimate annual production should increase to at least 30,000 bushels within a few years.

Good returns for these fruits have encouraged heavy plantings over recent years and the trend is expected to continue. Greatest development has been at Kerikeri, where more than 60 per cent of all orange trees are now established, but considerable plantings have also been made in the other districts, especially Gisborne.

The most popular varieties for planting are navel oranges, which so far have proved to be the most promising. More than 70 per cent of orange trees in commercial orchards are navel varieties.

Older Valencia plantings at Kerikeri have proved unsatisfactory and these trees are being removed and replaced. A trend to plant several other promising varieties which have originated in New Zealand, such as Best's Seedless and Harwood Late, is also developing.

Mandarins

More than 95 per cent of the 13,200 mandarin trees recorded are up to 10 years old, so that production should rise steeply to a level of at least 10,000 bushels in a few years.

Well over half of the trees are at Kerikeri and most of the remainder in the Bay of Plenty and at Auckland. As with oranges, high returns for these fruits have encouraged plantings in recent years.

The total yield of oranges and mandarins which can be expected represents no more than about 6 per cent of New Zealand's requirements for these fruits and should be readily absorbed provided the quality of the fruit is sufficiently good.

Tangelos

The number of tangelo trees recorded (about 1,040) is still small but is increasing. Practically all these trees are at Kerikeri and more than 90 per cent of them are up to 10 years old, so that production is likely to increase considerably. Present production is mainly of the Tiniura tangelo, but many of the recent plantings have been of the Seminole variety.

Reference

J. H. Watt: "Official Survey of the Fruit-growing Industry of New Zealand 1953", New Zealand Fruitgrowers Federation.

New Zealand Scientist's Pioneer Work in Spectrography

RECOGNITION of his pioneer work in absorption spectrography in chemical analyses was recently accorded an officer of the Department of Agriculture's Rukuhia Soil Research Station. He is Mr J. E. Allan, Senior Principal Scientific Officer, who was invited to deliver a paper to the Australian Spectroscopy Conference in Melbourne and be the guest of the Australian Government for two weeks.

Mr J. E. Allan.

Spectrographic analytical methods hold great promise as an aid to solving problems of trace element nutrition of plants and animals. A special feature is that several elements may be determined simultaneously in a relatively small sample.

Besides developing methods of spark and flame emission spectrography, Mr Allan has pioneered the application of absorption spectrography to analyses. The invitation to lecture to the conference is considered a tribute to his work on absorption spectrography and its importance in the field of modern chemical analysis.

Recent Research Work

Effect of Potassium Fertiliser on Sodium, Magnesium, and Calcium in Plant Tissues

SOME interesting results have been obtained in rates of potash trials on a potassium-deficient area of Horotiu sandy loam at Rukuhia.

WITH increasing rates of potassium chloride, the potassium levels in the leaf tissues increased progressively as indicated in Table 1. The fertiliser was applied in the spring before planting.

TABLE 1—MEAN PER CENT OF POTASSIUM (K) IN THE DRY MATTER

Plant	Sampling date	Potassium chloride per acre				
		0	½ cwt	1 cwt	2 cwt	4 cwt
Cocksfoot	25/11/57	1.7	2.6	4.0	4.4	4.9
Ryegrass	26/11/57	1.3	1.8	2.5	3.8	4.3
	25/3/58	1.1	2.1	1.7	3.1	3.9
Paspalum	4/3/58	1.4	2.1	2.8	3.4	3.6
Potatoes	17/11/54	2.3	3.2	4.0	4.9	5.5
Cabbages	19/12/55	1.3	1.8	2.6	3.3	4.0
Sugar beet	10/12/56	1.8	2.6	3.9	4.4	5.9

Uptake increased rapidly up to 1 cwt of potassium chloride per acre, but the increase was much less at higher rates. These trends are quite normal and similar in the different plants.

Sodium, on the other hand, showed an extraordinary difference in behaviour according to the plant type (Table 2).

TABLE 2—MEAN PER CENT OF SODIUM (Na) IN THE DRY MATTER

Plant	Sampling date	Potassium chloride per acre				
		0	½ cwt	1 cwt	2 cwt	4 cwt
Cocksfoot	25/11/57	0.91	0.70	0.16	0.11	0.04
Ryegrass	26/11/57	0.65	0.51	0.43	0.18	0.11
	25/3/58	0.82	0.46	0.72	0.40	0.13
Paspalum	4/3/58	0.12	0.09	0.06	0.05	0.04
Potatoes	17/11/54	0.07	0.07	0.07	0.07	0.07
Cabbages	19/12/55	1.20	0.91	0.43	0.24	0.14
Sugar beet	10/12/56	1.80	1.62	1.35	1.51	1.05

In potatoes the sodium level remained low and constant throughout, though the plants in the plots without potash later developed severe potassium deficiency symptoms. Paspalum (*Paspalum dilatatum*) showed low levels throughout and only a very slight absolute decrease with increasing applications of potash. By contrast, the other two grasses, cocksfoot (*Dactylis glomerata*) and perennial ryegrass (*Lolium perenne*), and cabbage showed very large depressive effects of potassium chloride on the sodium levels in the leaf tissues. Sugar beet showed high sodium levels throughout, but some reduction with potash applications.

Magnesium levels were influenced in varying degrees (Table 3).

TABLE 3—MEAN PER CENT OF MAGNESIUM (Mg) IN THE DRY MATTER

Plant	Sampling date	Potassium chloride per acre				
		0	½ cwt	1 cwt	2 cwt	4 cwt
Cocksfoot	25/11/57	0.22	0.23	0.16	0.17	0.17
Ryegrass	26/11/57	0.30	0.19	0.21	0.14	0.15
	25/3/58	0.39	0.34	0.37	0.36	0.29
Paspalum	4/3/58	0.57	0.43	0.35	0.23	0.25
Potatoes	17/11/54	1.25	1.13	0.92	0.76	0.58
Cabbages	19/12/55	0.68	0.62	0.59	0.55	0.47
Sugar beet	10/12/56	1.16	1.13	0.96	1.05	0.83

In this experiment magnesium uptake in all plants was depressed, especially in potatoes, paspalum, and early summer growth of ryegrass, after potash applications in spring. The effect was relatively small in cocksfoot, cabbage, and sugar beet. It was negligible in subsequent autumn growth of ryegrass with applications of potassium chloride up to 2 cwt per acre. In pastures, clovers usually have a much higher magnesium content than associated grasses. Potash applications to deficient pastures may therefore result in little change in magnesium concentration in the herbage because of an increase in the percentage of clovers.

Calcium levels were depressed to a similar extent in five of the six plants (Table 4). The effect on cabbage was small.

TABLE 4—MEAN PER CENT OF CALCIUM (Ca) IN THE DRY MATTER

Plant	Sampling date	Potassium chloride per acre				
		0	½ cwt	1 cwt	2 cwt	4 cwt
Cocksfoot	25/11/57	0.52	0.49	0.34	0.35	0.33
Ryegrass	26/11/57	0.69	0.55	0.54	0.43	0.39
	25/3/58	0.82	0.81	0.85	0.78	0.67
Paspalum	4/3/58	0.89	0.85	0.67	0.64	0.58
Potatoes	17/11/54	2.16	2.02	1.81	1.58	1.35
Cabbages	19/12/55	3.95	3.79	3.44	3.51	3.35
Sugar beet	10/12/56	1.48	1.43	1.31	1.39	1.14

The trends of all these results have been confirmed from analytical data from other experiments on the same soil type. The evidence from other soil types, though less extensive, is consistent, and it appears that the differences in behaviour of different kinds of plants are due to inherent differences in their abilities to take up certain ions rather than to properties peculiar to a soil type.

Many workers have concluded that there is an approximate constancy in the sum of the potassium, sodium, magnesium, and calcium in plant tissues, because of inter-relationships of the kind illustrated in the above tables, but the magnitude of differences in behaviour of different plant groups has not always been realised.

Plants may be classified into two groups: (a) those which make up for any deficiency of potassium mainly by increased absorption of sodium; for example, brassicas and most grasses; (b) those which take up increased amounts of magnesium and calcium but make little or no use of sodium; for example, potatoes and *Paspalum dilatatum*. Plants in group (a) utilise magnesium and calcium as well as sodium, but usually to a less extent than plants in group (b).

—K. J. McNAUGHT, Principal Scientific Officer,
Rukuhia Soil Research Station

Chick Nursery Coop

DAY-OLD chicks are raised by the battery brooder system by most poultry farmers in the Blenheim and Nelson districts, where the favourable climate makes it possible to transfer chicks outside at an early age straight from this type of brooder.

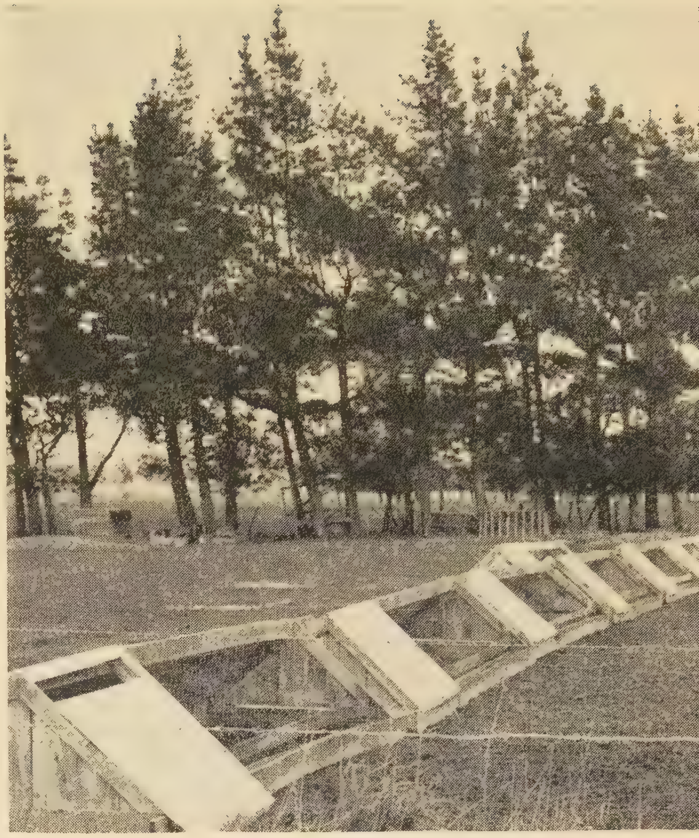
THE chickens are transferred from the batteries at three to four weeks, which is too young for the use of the large open range arks commonly favoured in most districts. Consequently a special type of coop, or nursery, as some poultry farmers term it, has been evolved to suit these young birds. It hardens the chickens off completely and acts as an intermediate stage before the young birds are placed in ark houses.

In this article **P. JOSLAND, Poultry Instructor, Department of Agriculture, Wellington,** describes this type of chicken nursery. It was designed by Mr G. L. A. Smith, poultry farmer, Blenheim, and has been used by him successfully for several years.

Design

The design of this chick nursery corresponds in layout to the average battery brooder. The sleeping compartment is at one end, the water at the other, and the feed trough down one side. It is because of this similarity that the easily manoeuvrable nursery is most valuable.

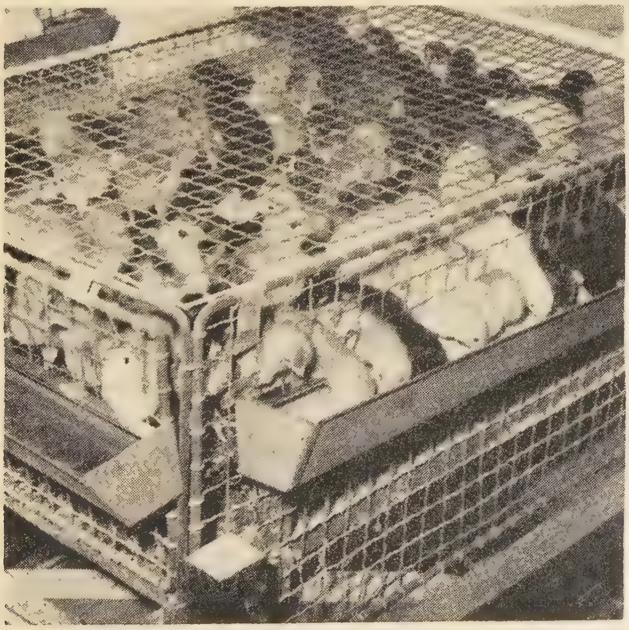
Chickens that have been reared in a battery brooder are not accustomed to searching far for feed and water, which are always within easy reach. Consequently when battery chicks are subjected to a complete change of environment such as moving from the brooder to a large open ark house, they can have difficulty in finding food and water, particularly in bad weather. When this happens the chicks receive a setback from which they seldom

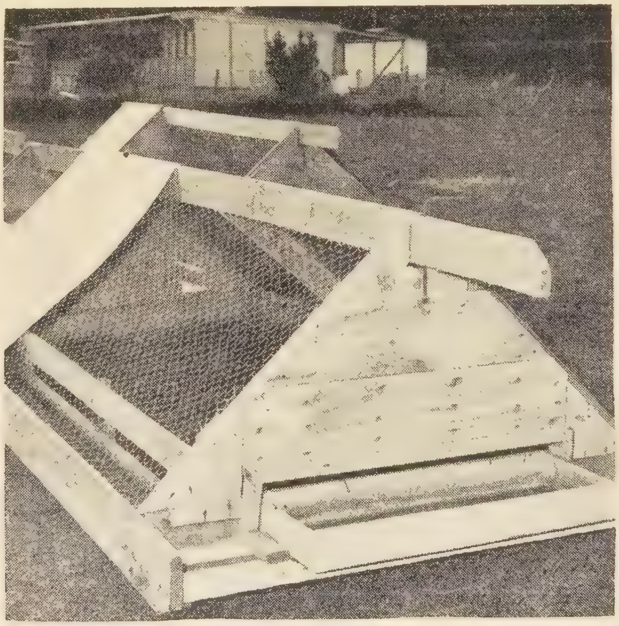


▲ The coops are shifted to a fresh area of ground each day. Failure to move the coops daily could lead to an outbreak of caecal coccidiosis.

[*"New Zealand Herald"*

▼ Chickens in a battery brooder (left), showing the feeding arrangements, which are similar to those in the chick nursery coop (right).





TARTAN
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P.7.

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Contains 3% "Micronised" Dieldrin prepared as a flocculant type dust for application to sheep for control of Keds and Lice and to give protection against Blowfly Strike.

APPLICATION:

The dust should be applied only with a HOWRY-BERG or similar pressure dusting machine. Its use in machines with poor feed mechanism or poor air delivery must be avoided at all costs otherwise erratic parasite control will result.

DOSAGE:

The optimum dosage is 1-1½ ozs. of dust per sheep: that is 10-15 sheep per pound. This rate may only be reduced in special circumstances, namely treatment of short woolled sheep in the Summer for Keds and Lice only. Reduced dosage will NOT give positive Flystrike protection.

CONTROL OF KEDS:

A single dusting is effective in eradicating Keds even on heavily infested long-woolled sheep.

CONTROL OF LICE:

Heavy infestations of Lice can normally be controlled with one dusting. Treatment within three months of shearing is preferable but not essential. Winter applications must be at full strength.

BLOWFLY STRIKE:

A single dusting thoroughly applied will give several weeks' protection (usually six weeks and upwards). Repeat treatments may be necessary during prolonged or widely spaced periods of attack.

GENERAL DIRECTIONS:

Dust coverage must be thorough, especially to get Flystrike protection. Machine maintenance and set up is an important factor here. See Bulletins G.5 and E.1. Avoid drift of dust on to crops or pastures where bees are working or which may be used for grazing or foodstuffs. Dogs should not be allowed through the dust race more than once.

TOXICITY:

Dieldrin is a noxious substance and protective clothing and precautions listed on the label must be followed. A respirator recommended by the Department of Health should be worn when the operator is unable to keep out of dust drift.

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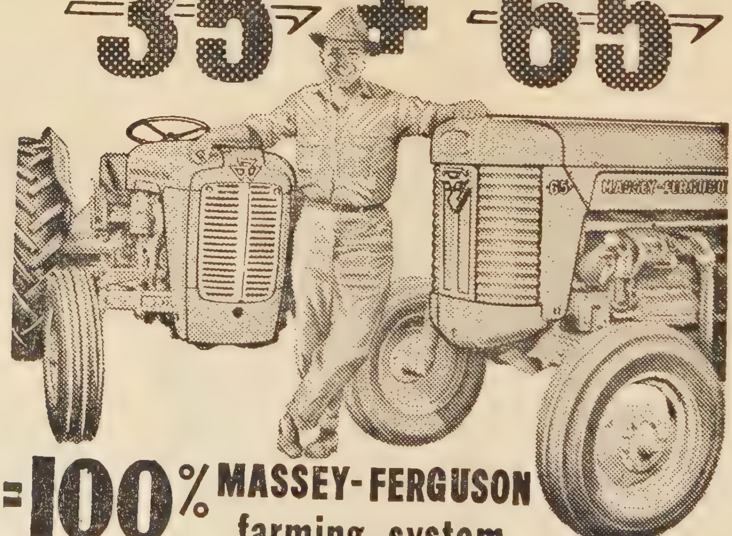

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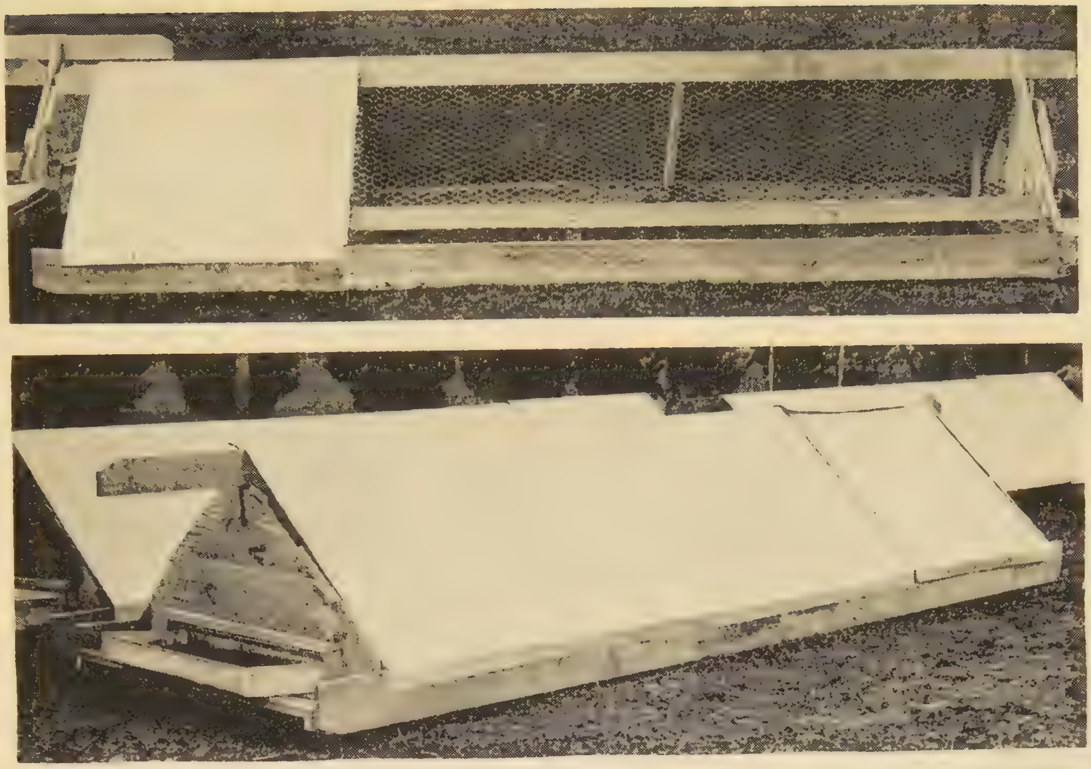


The chick → nursery coop, showing the open side and below it a view showing the closed side.

completely recover. Their constitutions are affected so that the natural resistance of the chicks to a disease such as coccidiosis is seriously lowered. The illustrations at the bottom of page 443 show the similarity of feeding arrangements of a chick battery and the coop.

Construction

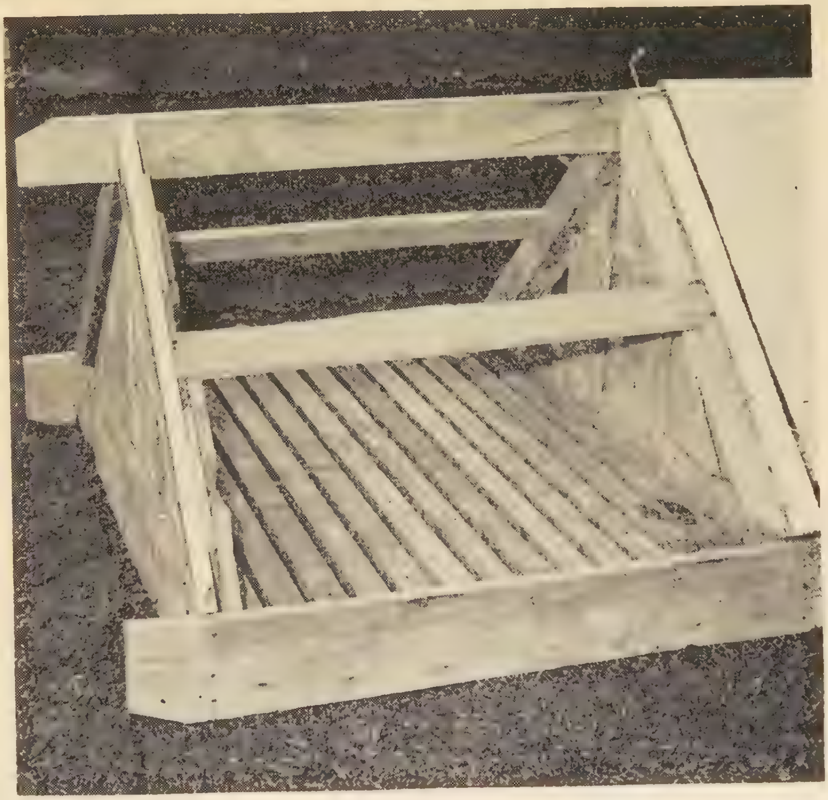
Detailed plans for the chick nursery are available on application to the Poultry Instructor, Department of Agriculture, Wellington.

The cost involved is about £4 10s. a nursery. The ends are covered in with boxwood which most stores give away and there is no waste with the galvanised flat iron used, as the measurements are such that each coop takes two sheets. A sheet is used to cover one side of the run and the other is used to provide the roof for the sleeping compartment and off-cuts from it for the drinking trough and some 2 in.-wide strips are used for flashing to prevent draughts in the sleeping quarters. The floor of the sleeping compartment is made of wooden slats, which have been found superior to wire netting in colder months. The top of this compartment is detachable so that the sleeping quarters can be exposed to the sun as shown at right. It would be an added advantage to have the wooden slats constructed as a removable frame to simplify cleaning.

The coop is 11 ft x 4 ft, 8 ft x 4 ft comprising the outside run and 3 ft x 4 ft the sleeping compartment. The coop tapers to a 4 in. x 1 in. ridging board at an over-all height of 27½ in. The ridging board is extended 18 in. over the water trough end and 6 in. at the other end.

Management

The chicks are transferred to the nurseries at four weeks of age in the cold months and at three weeks in warm weather. In cold weather as



The top of the sleeping compartment is detachable to allow the sun's rays to penetrate and to aid in cleaning out.

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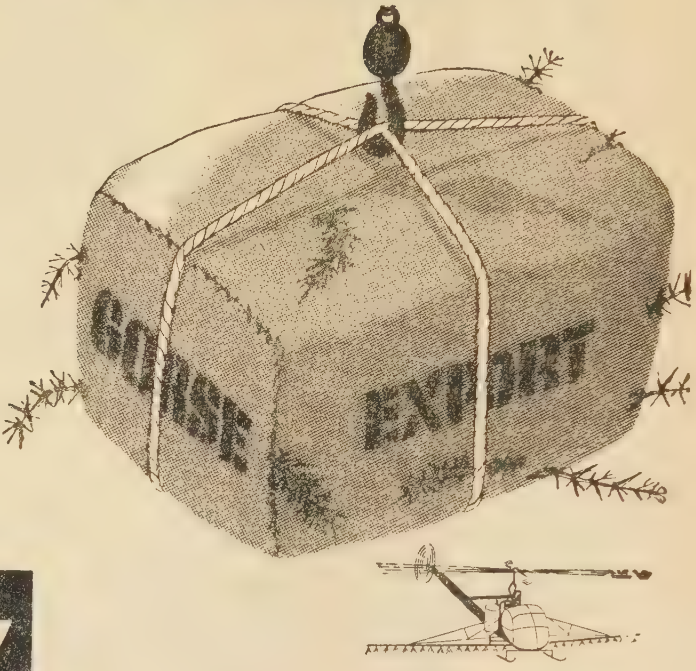

Gorse clearing can be done for as low as £10 per acre including application by Helicopter. Ask for copies of Advisory Bulletins W.12 and M.3 and full details from—

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many as 70 chicks have been housed in one nursery. However, they must be graded down to 20 to 30 by six weeks. At seven to eight weeks they are removed to ark houses, where they remain until brought into the laying sheds.

The chicken nursery is suitable in all weathers. It was severely tested on a bad day last rearing season with a wind of gale force and driving rain from the north-west. The chicks had been in the nurseries for three days, having been put out at two and a half weeks of age. The protected side of each shelter was turned into the wind so that it faced south. The chicks were let out for an hour at a time and though wet when chased inside, they soon dried out and were eager to get out again. In frosty weather the chicks are not allowed on to the run until the frost is off the ground. They are chased inside about an hour before sunset. It has been found that about an hour a day is required to manage 800 chicks.

The nurseries are shifted to a fresh area of ground each day, either by using a set of trolley wheels under one end and pulling lengthways or by lifting one end at a time sideways. This can be done by one man and is usually carried out while the chicks are shut in the sleeping quarters. When the nurseries are shifted daily ground recovery is rapid and the light covering of manure left by the chicks greatly improves the pasture.

Failure to move the chicks on to clean ground regularly may result in an outbreak of caecal coccidiosis. Though the coccidia are not infective when first expelled in the droppings, after two days in favourable conditions infection is possible. By moving the chicks daily coccidial reinfestation is avoided.

Battery brooded chicks have not developed a natural resistance to the disease, as they are kept from contact with the droppings and are thus highly susceptible. Moving the chickens to fresh ground daily is therefore of great value as a protection against a possible coccidiosis outbreak.

Feeding

No change is recommended in the diet while the chicks are in the nurseries. The battery brooder mash should be fed and the protein content of the diet held at 20 per cent. The change from a chick mash to a growers' mash is made gradually after the chicks have been transferred to the ark houses. A growers' mash is similar to the chick mash except that the protein content is reduced to 16 per cent by the introduction of grain into the ration.

The following chick mash is used at the Department's Poultry Demonstration Plant, Upper Hutt, in battery brooders with success.

	lb
Bran	6
Pollard	10
Coarse ground wheat	50
Maize meal	10
Meat meal (50 per cent protein)	12
Milk powder	6
Dehydrated lucerne	4
Oyster shell dust or ground limestone	1½
Manganese salt	½

Vitamin A and D_3 should be supplied as recommended by the manufacturers. Manganese sulphate is premixed with the salt portion of the mash at 6 oz per ton and then remixed into the remainder. This ensures an even distribution of manganese.

No grain is used with this mash, but a small amount can be introduced into the ration as a token scratch feed at five to six weeks. By eight to nine weeks the chickens should be on a mash/grain diet. This will reduce the protein content of the diet to the desired level without any alterations having to be made to the mash formula. At the same time it is necessary to feed free choice oyster shell or lime grit and a hard insoluble grit.

With good management, attention to detail, and a properly balanced diet the chick nurseries produce solid, well feathered pullets for transfer to ark houses and, equally important, a healthy, vigorous perching pullet that is easily caught and graded for dispatch.

Saving Mature Feed for Hoggets

A COMMON form of ill thrift in hoggets occurs in the North Island after autumn rains when the hoggets are kept on what looks like the best of short, fresh, high-quality feed. This fresh autumn growth is not good for them; they eat little of it, go off in condition, and are unable to resist the attack of internal parasites. With the onset of colder weather, however, the feed hardens and those hoggets that are not too far gone to survive the winter pick up in condition.

Where this type of ill thrift occurs, the saving of a sufficient area of summer growth to provide mature feed for the hoggets from March to April and sometimes into May is recommended. Research work on the problem of hogget ill thrift caused by the autumn flush of grass has shown that hoggets transferred to paddocks which have been closed in December and early January do quite well, making satisfactory weight gains each week, though not growing as fast as they did in January and February.

Area to Close

About 1 acre to each four to five hoggets should be enough to provide the right kind of feed for some eight to ten weeks. This feed should not be used until it is required, but no time should be lost in getting the hoggets on to it immediately warm autumn rains start a fresh flush of feed on the grazed areas.

The area to be saved should be closely grazed before shutting up to get as much clean, fresh summer growth as possible before the soil dries out. In the wetter districts top growth should be controlled by cattle; in the drier districts, though the saved grass will dry out, it is still much better feed for the hoggets in March and April than new growth on closely grazed areas.

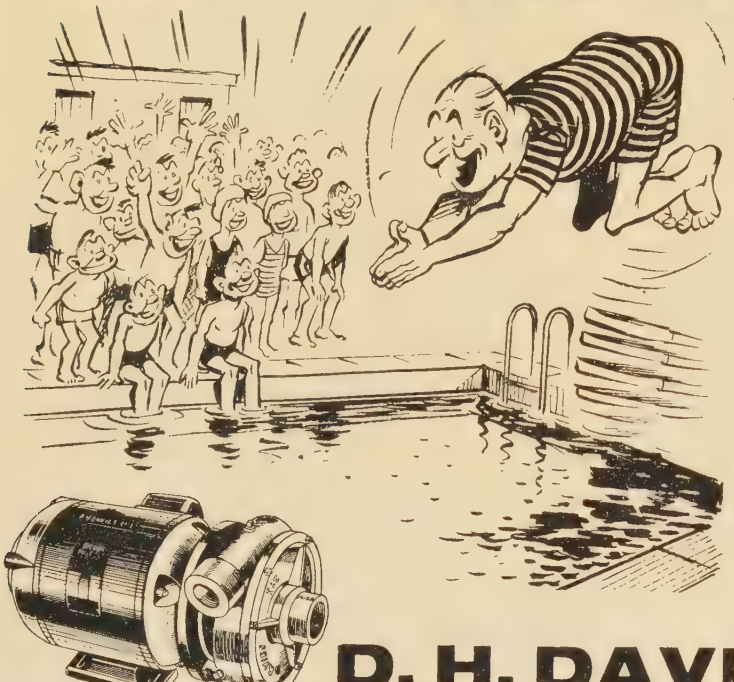
—*W. B. H. SMITH,*
Fields Instructor,
Department of Agriculture,
Masterton

Wool Sales

The dates and venues of wool sales up to the end of February are:

18 and 20 November: Napier.
25 November: Wellington.
4 December: Christchurch.
9 December: Invercargill.
14 December: Dunedin.
18 December: Timaru.
13 January: Wanganui.
18 and 20 January: Auckland.
25 and 27 January: Napier.
1 and 3 February: Wellington.
15, 17, and 19 February: Christchurch.
24 and 26 February: Invercargill.

DAD and DAVIES GO BACK TO SCHOOL



Dad is Chairman of the local school Committee. (That's him taking the first dive at the opening of the baths). And he's doing a great job. In fact, both the teachers, the children and even the parents love him for the work he is getting done. His big venture . . . the local swimming pool. And what is more, Dad is modern in his outlook. He has installed a complete filtration plant, powered by a Davies' pump and tanks all made in Davies' factory. Dad reckons now that there is no worry about the water in the swimming pool. He reckons it is good enough to drink, it is so clean and in excellent condition. See . . . Dad's looking after the health of the young children too.

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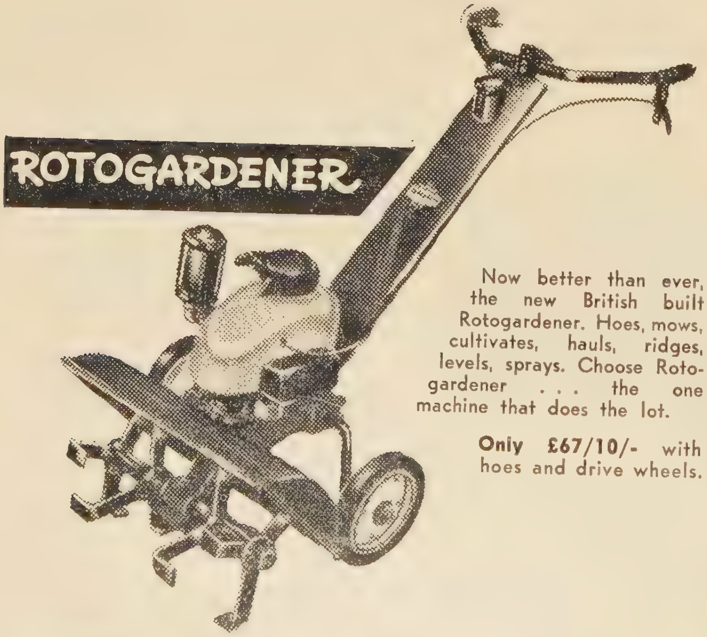

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Production of Section Comb Honey; Control of Grass Round Beehives

Seasonal Notes for the Domestic Beekeeper

By D. A. BRISCOE,
Apiary Instructor,
Department of Agriculture,
Tauranga

SECTION comb honey is popular with consumers, and the beekeeper who is prepared to devote a little extra time to the management of his hives to produce good-quality sections will have little difficulty in marketing them. Sale of this product depends mainly on its attractiveness when placed on the retail market. Sections that are poorly finished by the bees, have become damaged and are "weeping", or have not been cleansed of travel and propolis stains have very little appeal to the consumer.

THE management of hives for the production of section comb honey is more difficult than it is for extracted honey and to harvest a maximum honey crop in first-class sections the beekeeper must first acquire a good understanding of bee behaviour and the honey flow conditions in his district.

Best results are obtained in localities where there is a profusion of suitable flora and a heavy and sustained nectar flow each season.

The equipment necessary to produce section comb honey includes at least one half-depth super, a set of seven section holders or frames with metal or wood separators attached, a supply of wood sections, and a pound or so of thin comb foundation.

Assembling Equipment

The half-depth super is made up in the usual way and should be check nailed at the corners. The section comb holders are assembled in much the same way as an ordinary frame with the exception that a tin separator is attached to the side of each. The purpose of this separator is to prevent the bees from building the comb of one section and joining it up to the one in the next row.

Sections are procured in the flat and folding and fitting them with foundation require care. First the bundle of sections should be immersed in hot water and allowed to stand for a few minutes to make sure that the wood is well saturated and pliable. Begin bending the section into shape from the end without the split and avoid any quick folding movements. Remember that the wood at the V joint is very thin and will break readily if it is subject to sudden pressure.

When it comes to folding the split end, only the first half should be locked in position. The remaining half is left standing in a semi-upright position until the piece of thin super foundation is placed in position. When the section has been locked by this first half of the split end, the section should be "squared" as much as possible before the V joints have had a chance to dry out again. If squaring is left until the V joints have dried out, breakages may occur.

Cutting and Fitting Foundation

Thin super foundation comb is supplied in sheets approximately 4 in. wide x 16 in. long. Each sheet should be cut into four pieces of equal size to fit the sections. When sufficient sections have been folded insertion of the pieces of foundation can begin. Each piece of comb is placed against the split of the fixed section end and allowed to overlap the top by about $\frac{1}{8}$ in.

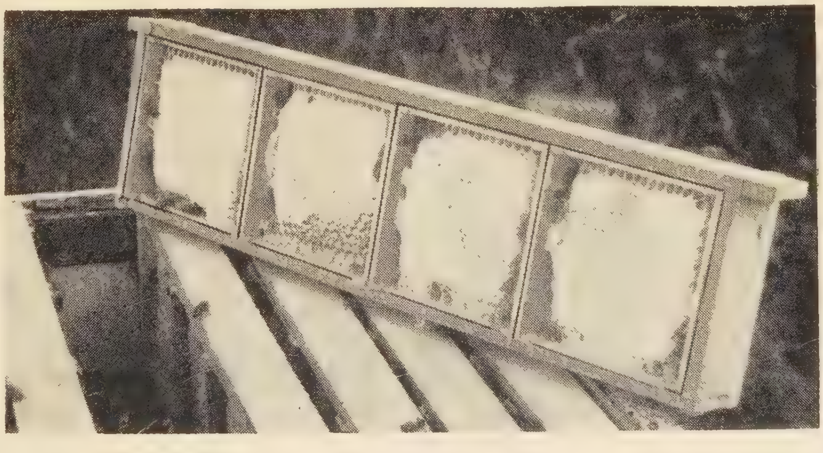
When the remaining half of the section end is folded down and secured, the wax foundation will then be held firmly in position. Four of these prepared sections are placed in each section holder, of which seven are required for each half-depth super. When section holder frames are placed into the super care is necessary to ensure that no two separators on the section holders are together.

Hive Management

Only the best and strongest hives should be selected for the production of section honey. **The hive must be "boiling over with bees".** Hives should be headed by young, vigorous queens and should be allowed to build up to maximum strength to coincide with the start of the main honey flow.

As soon as the honey flow begins, the selected colonies should be reduced to a single-storey brood chamber. This brood chamber should be filled with combs of capped brood. Bees on other combs are then shaken in the front of the hive and the remaining combs of brood are distributed among other or weaker hives. If the domestic beekeeper has only one hive, he may not be able to reduce his hive in this manner.

The severe crowding of bees that develops with this manipulation is liable to induce swarming, but this is a calculated risk that the beekeeper must take and be prepared to combat. A queen excluder is placed on the hive over the brood nest and then, according to the vigour of the honey flow, one or two half-depth supers



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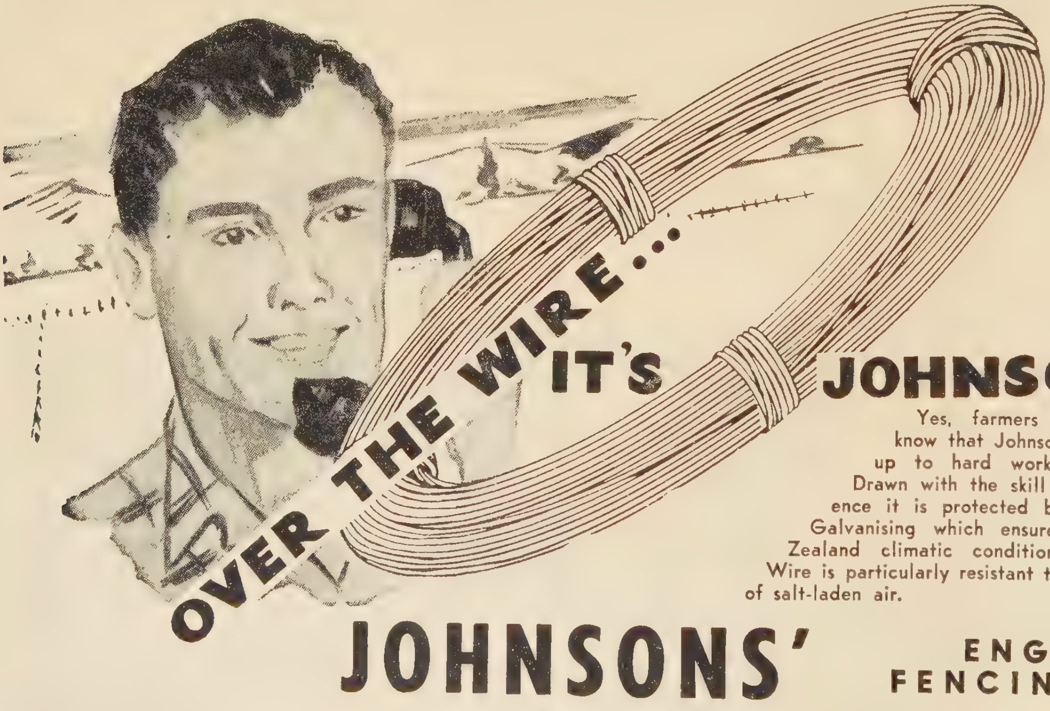

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Sections of comb honey cleaned and wrapped in transparent cellulose.

containing sections are added. Giving more supers than is immediately necessary is unwise, as one of the secrets of successful comb honey production is to place the sections on to the hive and get them filled and off again as quickly as possible.

When sections are left on the hives the comb surfaces become travel stained by bees continually passing over them; on the other hand in colonies that are oversupered the "drawing out" and filling of the sections becomes uneven and this results in a big percentage of sections that are inferior or unsalable. Correct timing and proper carrying out of this manipulation are therefore important.

Cleaning of Sections

All sections should be completely capped before being removed from the hive. When they are on the hive the bees are inclined to cement the sections to the section frame holder with propolis. The section loses a lot of its attractiveness if this is not cleaned off.

After removal from the hive this propolis hardens and becomes brittle. In this state it can be quite easily removed by scraping with a blade or knife. Care should be taken not to damage the cappings of the comb; otherwise "weeping" will result.

If the sections are to be sold, it is advisable to wrap each section in a piece of transparent cellulose, as this greatly increases their attractiveness.

GRASS ROUND BEEHIVES

Long grass in the front of hives restricts the foraging bees as they leave or enter their hive. Where growth is excessive much valuable pollen is lost through the bees having to scramble through the long grass to reach the hive entrance. At critical periods in spring the loss of this pollen may seriously affect the progress of the bees in building up colony strength.

Long grass round hives also prevents adequate air circulation, with the result that hive parts are constantly wet and the inside of the hive is musty and damp. Combs go mouldy and frames and hive parts soon rot if these conditions are allowed to prevail for very long.

Excess vegetation can be kept in check round beehives in several ways. An apiary may be well kept and attractive on a piece of lawn, but if the person cutting the grass gets a sting or two the hives may soon get a wide berth.

Use of Concrete Slabs

On permanent sites in the home garden square concrete slabs in the front of each hive look tidy and afford an edging for the mower.

Rank growth round apiaries away from the home garden may be temporarily controlled by skimming the turf in front of the hives with a sharp spade.

Fuel oil applied to grass round beehives will check its growth for many weeks. Though the fuel oil has quite a strong odour, it does not appear to harm the bees unless they come in contact with the liquid at time of application. Commercial weedicides applied once or twice a year will also give good control.

A. and P. Show Dates

NORTH ISLAND

November

20 and 21 November—Egmont at Hawera.
*21 November—Bay of Islands at Waimate North.
21 November—Rotorua at Rotorua.
27 and 28 November—Auckland at Epsom.
27 and 28 November—Stratford at Stratford.

December

5 December—Helensville at Helensville.
5 December—Kaikohe at Kaikohe.
5 December—Hauraki at Paeroa.

January

1 January—Nuhaka at Nuhaka.
22 and 23 January—Feilding at Feilding.
*22 and 23 January—Wairoa County at Wairoa.
29 and 30 January—Horowhenua at Levin.
*30 January—North Kaipara at Paparoa.

February

3 February—Marton District at Marton.
4 February—Te Kauwhata at Te Kauwhata.
*5 and 6 February—Rodney at Warkworth.
6 February—Woodville at Woodville.
6 February—Rangitikei at Taihape.
9 and 10 February—Dannevirke at Dannevirke.
10 February—Te Awamutu at Te Awamutu.
12 and 13 February—Taranaki at New Plymouth.
12 and 13 February—Taumarunui District at Taumarunui.
13 February—Tauranga at Tauranga.
13 February—Pahiatua at Pahiatua.
*13 February—Hukerenui at Hukerenui.
13 February—Waiapu at Ruatoria.
16 February—Otorohanga at Otorohanga.
18 February—Matamata at Matamata.
19 and 20 February—Ohura at Nihoniho.
19 and 20 February—Franklin at Pukekohe.
19 and 20 February—Masterton at Masterton.
20 February—Te Puke at Te Puke.
24 February—Morrinsville at Morrinsville.
26 and 27 February—Te Kuiti and District at Te Kuiti.
26 and 27 February—Wellington and Hutt Valley at Trentham.
27 February—Mangonui County at Kaitaia.
*27 February—Putaruru District (Jubilee Show) at Putaruru.
27 February—Northern Wairoa at Arapohue.
27 February—Waimarino at Raetihi.
27 February—Whakatane at Whakatane.

March

5 March—Albany at Albany.
5 March—Opotiki at Opotiki.
*12 March—Kumeu District at Kumeu.
*19 March—Wellsford at Wellsford.

SOUTH ISLAND

November

18 November—North Otago at Oamaru.
20 and 21 November—Nelson at Richmond.
21 November—Waimate at Waimate.
21 November—Courtenay at Kirwee.
*21 November—West Otago at Kelso.
24 and 25 November—Timaru (South Island Championships) at Timaru.
*28 November—South Otago at Balclutha.
28 November—Motueka at Motueka.

December

1 and 2 December—Gore at Gore.
5 December—Wyndham at Wyndham.
5 December—Otago Peninsula at Portobello.
*11 and 12 December—Southland at Invercargill.

January

16 January—Waikouaiti at Waikouaiti.
23 January—Palmerston and Waihemo at Palmerston, Otago.
23 January—Peninsula at Duvauchelle.
23 January—Waiau at Tuatapere.
26 and 27 January—Otago at Dunedin.
30 January—Banks Peninsula at Little River.

February

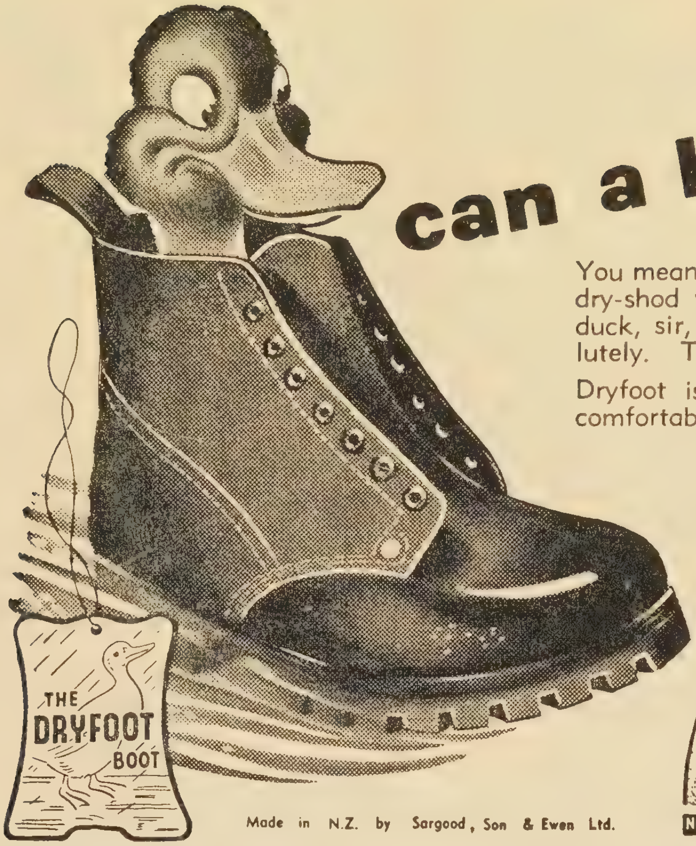
13 February—Inangahua at Reefton.
20 February—Maniototo at Ranfurly.
*20 February—Murchison at Murchison.
27 February—Kaikoura at Kaikoura.
27 February—Central Otago at Omakau.

March

5 March—Amuri at Rotherham.
12 March—Mayfield at Mayfield.
12 March—Cheviot at Cheviot.
12 March—Mt. Benger at Roxburgh.
12 March—Upper Clutha at Wanaka.
19 March—Methven at Methven.
19 March—Hawarden at Hawarden.

* The Department of Agriculture exhibit will be staged at this show.

can a boot swim?



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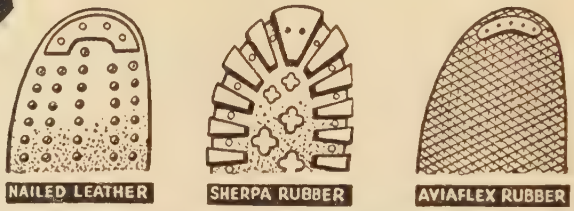

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Farmer's Success with Modified System of

Early Weaning of Pigs

NEW ZEALAND farmers have the reputation of rapidly applying findings which are capable of improving their efficiency, particularly in so far as this can be measured in output per man hour. The failure of many farmers to attempt anything earlier than six- or seven-week weaning of piglets, even though the principles of early weaning have been widely known and publicised for four or five years now, therefore requires some examination.

Are the claims made by the enthusiasts illusory?

Are there aspects of management which have not been appreciated by those who have tried out what was advocated and been disappointed with the results?

In this article A. Longwill, Advisory Officer (Pig Husbandry), Department of Agriculture, Wellington, suggests answers to these questions and details the methods of a farmer who has adapted his pig management to the early weaning method and is successfully practising his modified system.

WITH the proviso that early weaned pigs must grow as fast and economically as pigs reared in the normal way, the following advantages should accrue to the farmer who adapts his management properly:

- Less feed required by each sow and a greater proportion of it in the form of grass or crop, our cheapest foods.
- Improved overall efficiency in food use (and therefore better returns for pigs per pound of butterfat) by reduction of the amount of double conversion of food through the sow.
- Better conformity between the requirements of the pig herd and the fluctuating food supply.
- Early farrowing of summer litters, which will help to remove the need to carry store pigs over winter.

Aims

To get the full results theoretically possible the following aims must be achieved:

1. An increase of 10 to 20 per cent in the sow herd; farrowings arranged in pairs at dates beginning (for winter litters) at least 10 weeks (with whey) to two months (with skim milk) ahead of the median calving date for the herd.

2. Housing with special provision whereby the pigs can keep themselves warm from an early age.

3. Provision of carefully compounded, special starter feed. (This is more expensive than most supplements.) Take special precautions to minimise waste (for example, food taken by birds).

4. Maintenance of the breeding cycle so that litters are obtained when required to fit into the production plan and numbers born and weaned do not deteriorate.

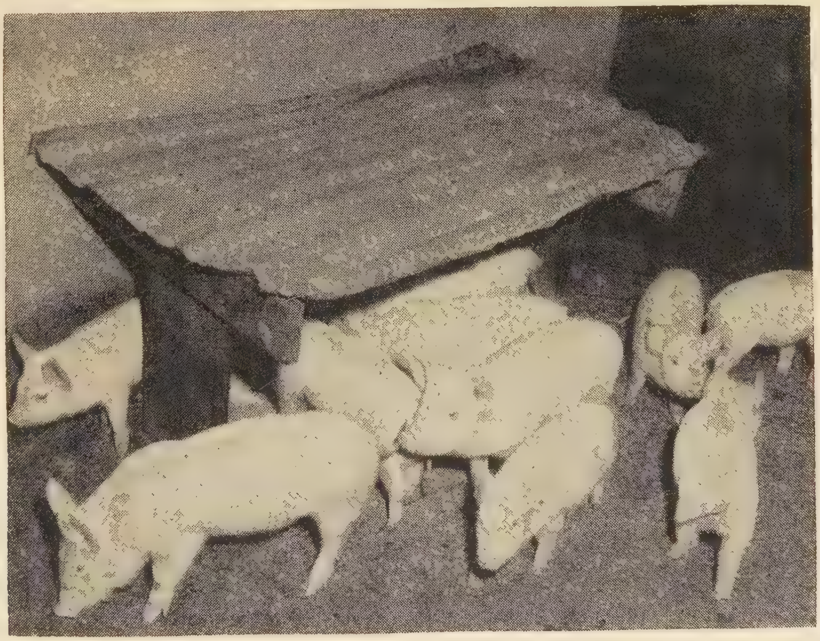
5. Maintenance of a higher standard of management and more attention to detail than is so often given to pigs on New Zealand farms. (The early weaning system advocated in this article does not, however, increase the labour required.)

SUCCESSFUL SYSTEM

On the farm of Messrs Searle Bros., Monovale, Cambridge, Mr Frank Searle, who is in charge of the pigs, has experimented with early weaning for some three or four years. He has, with special early weaning starter foods now available, been able to

Premium for Baconers

A special, quality-premium schedule for baconers is to be offered for a trial period during 1959-60. The schedule, which will operate from 1 November, has resulted from negotiations between producers' representatives and the trade. The Department of Agriculture recommends all producers of quality pigs to market their baconers under the new schedule.



The piglets are encouraged to take meal independently at an early age by provision of a palatable mixture in a shallow trough in the creep area.

YOUR MARKETS OVERSEAS · NO. 4 OF A SERIES

HOMEWARD BOUND

That ship you see steaming out of the harbour is almost certainly en route to the United Kingdom. But how does she get there? There are many different routes she can take, as we have shown you in previous advertisements: through the Panama Canal to Curacao and across the Atlantic; via West Indies ports; through the Suez Canal and the Mediterranean, calling at Piraeus and Genoa; and to North European ports. And even then she may still visit several of the half-dozen or so United Kingdom ports regularly served by the Lines. In brief, the New Zealand Overseas Shipping Lines are New Zealand's consistent overseas carriers; their ships go wherever there is trade for New Zealand. *Wherever* there is trade: for example, since late last year several of the Lines' vessels have carried dairy products to Mollendo and Callao in Peru and more recently meat as well; ships have also been calling at La Guaira in Venezuela to discharge fruit. Where new, expanding markets are discovered, there you will find the ships of the Lines. For it is these ships—the ships of New Zealand—that deliver the goods.

NEW ZEALAND OVERSEAS SHIPPING LINES

SHAW SAVILL & ALBION CO. LTD · THE NEW ZEALAND SHIPPING CO. LTD · PORT LINE LIMITED · BLUE STAR LINE LIMITED

develop a system which should be within the scope of many New Zealand pig producers.

Initially, Mr Searle went to a great deal of trouble with housing and artificial heat to endeavour to follow research station and overseas practice of weaning at seven to 10 days old. He found this impracticable under his conditions so tried leaving the pigs longer on the sow—until they started feeding independently. Early weaning meal is offered in the creep trough from the time piglets are 10 days old. With the use of heat lamps weaning at three weeks proved successful, but as a result of further experience Mr Searle has adopted four weeks' weaning as standard practice. No heat lamps are used, but the newly weaned pigs are housed in a covered kennel in which they can keep themselves warm.

The covered kennel temporarily rigged up in the creep area where pigs are bedded on shavings when weaned at 28 days.

Piggery Accommodation

The piggery consists of six units of the Waikato dual-purpose house which includes a covered creep area between the sleeping floor and feeding race with feeding yard to the side. The main feed trough, placed at right-angles to the feed race, runs the full depth of the yard, covering the sleeping floor and creep. Units are arranged back-to-back and face-to-face. The creep area can be shut off by the closing of a door the bottom of which is 10 in. above floor level.

The rest of the piggery comprises grass runs with open-fronted movable shelters typical of the Waikato layouts of 20 years ago. Grazing is well controlled, however, and grass in the pig runs has been kept in good condition. Dry sows run out in good grass paddocks and sleep in open-fronted wooden huts.

Self-feeders are used in the creeps to provide the special creep meal or pellets ad lib. Small movable water troughs are regularly cleaned and filled with clean water, which is also always available.

Farrowing Management

On this farm cows calve from the end of June and half the herd has calved by about 20 July. The aim has been to have sows farrow in pairs, starting about the last week in April.

As a result of experience to date, Mr Searle is going to advance farrowings a further fortnight. The table below sets out the farrowing plan envisaged, farrowings being spaced in pairs at fortnightly intervals. That this regularity is unlikely in practice is realised, but unless it is attempted on a planned basis nothing remotely resembling this result will be achieved.

It is undesirable in New Zealand to go ahead continuously mating after early weaning, as this would mean farrowings in a period unsuitable for getting the most economical use of the fluctuating food supply. It is necessary, therefore, to hold back sows from service for about 10 weeks after weaning the summer litter. This introduces one of the problems associated with the practice of early weaning. Some sows fail to conceive readily after this spell or, if they do, may have litters of few pigs.

The reason for this is not clear. The trouble has not occurred with early weaned sows at Ruakura, possibly because management of these sows is carefully directed:

(a) They are held in firm condition but overfattening is rigorously avoided.

(b) A record is kept of heat periods and sows are flushed for a week or two by feeding about four gallons of milk or its equivalent plus grass, depending on her condition, after the last heat period before the one at which she is to be mated.

These aspects of sow management are important in the securing of satisfactory winter litters, the importance of which to the overall efficiency of the pig unit should not require emphasis. They do, however, entail a degree of careful sow management which has not in the past been considered practicable by many dairy farmers. Service and farrowing dates are seldom recorded, but this is essential in the more careful sow management required. Shed sheets to enable this to be done easily are available from the Department of Agriculture.

The essential thing, however, is to have the management pattern clearly laid down and put the plan into operation, carefully following through and quickly introducing remedial measures for any breakdown. Reports from overseas support the view that problems of irregular breeding and small litters associated with early weaning practice are chiefly attributable to management.

FARROWING PLAN FOR SOWS MATED IN PAIRS

	Winter litters (sold in spring and summer)			Summer litters (sold in autumn)		
Sow	Mating	Farrowing	Weaning	Mating	Farrowing	Weaning
1, 2 ..	22 Dec.	15 April	13 May	20 May	11 Sept.	9 Oct.
3, 4 ..	5 Jan.	29 April	27 May	3 June	25 Sept.	22 Oct.
5, 6 ..	19 Jan.	13 May	10 June	17 June	9 Oct.	6 Nov.
7, 8 ..	2 Feb.	27 May	24 June	1 July	22 Oct.	20 Nov.
9, 10 ..	16 Feb.	10 June	8 July	15 July	6 Nov.	4 Dec.
11, 12 ..	2 Mar.	24 June	22 July	29 July	20 Nov.	18 Dec.
13, 14 ..	16 Mar.	8 July	5 Aug.	12 Aug.	4 Dec.	1 Jan.
15, 16 ..	30 Mar.	22 July	19 Aug.	26 Aug.	18 Dec.	15 Jan.

Two-litter System

Where for any reason a farmer is unable to give the required attention to sow management to secure continuing good results, a system of working entirely with young sows, taking only two litters from them before disposing of them as choppers, may be considered. The most promising gilts from the winter litters would be kept for breeding, being mated to farrow when approximately 12 months old.

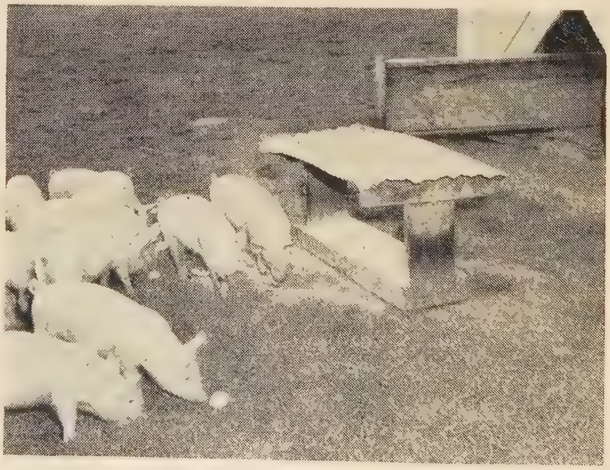
Flexibility is desirable to allow for the best of the sows to be carried over for a second, or even third, season. If more gilts are mated than will be required, there will be a ready sale at remunerative prices for the surplus houses with covered creep.

Feeding Method

In Mr Searle's piggery the winter litters are farrowed in the dual-purpose houses, which permit full control over sows and litters. Some summer litters are farrowed in the open-run houses and when a week or so old are brought into the control houses with covered creeps.

The pigs are encouraged into the creep at as early an age as possible. With the palatable special early weaning starter foods now available little difficulty is experienced in getting the litter started in the creep from 10 days old. For the first few days a little of the meal is put in the trough of a self-feeder and replenished as it is cleaned up; then the meal is put in the self-feeder and is always available to the litter.

After a week or so No. 1 pellets are gradually introduced and a progressive changeover made so that when the time for weaning (4 weeks) arrives the litter will have been on pellets only for a day or two.



Weaners are allowed to run out as early as the weather permits. Summer litters have meal always in front of them in the grass run.

Weaning Management

Mr Searle has been using the side creep of the house for the purpose for which it was originally designed, but he wants a small kennel into which he can concentrate enough pigs for them to maintain a comfortable warmth. Therefore, on weaning, he switches the sleeping floor to this creep area (some 5 ft x 3 ft), covers it with a well insulated lid, and hangs a sack over the entrance to keep the heat in.

In this kennel he concentrates two litters totalling 16 to 20 pigs. They thrive without artificial heat when bedded on 2 or 3 in. of wood shavings. These are held in position by concrete blocks placed on their sides and moved to provide an expanding sleeping floor as required by the pigs.

This handy method is also followed for providing an expanding sleeping floor when the pigs outgrow the creep area and are returned at about 5 weeks to the main sleeping floor of the house. After pigs have been a week or so here any that are backward are returned to the kennel, kept longer on pellets, and given an antibiotic supplement.

Feeding after Weaning

No. 1 pellets are continuously available in the self-feeder for the first few days after weaning. These, with clean water, provide all the feed. After three or four days a home-mixed meal comprising three parts of barley meal (finely ground) and one part of buttermilk powder (and perhaps 10 per cent of meat meal) is introduced as a slop mixed with a little milk and fed in a separate small trough. The ration is increased gradually and made more sloppy with additional milk. When the pigs are taking this readily the No. 1 pellets are withdrawn and the slop gradually increased until when pigs are eight weeks old the feed ration per pig is as follows):

Morning feed: ½ lb meal and ¼ gallon skim milk (slop)

Midday: ¼ gallon of skim milk

Evening: ½ lb of meal and ¼ gallon of skim milk (slop)

This is the first stage at which any skim milk is given as a drink. It has been found that in this way scours have been minimised. Cleanliness, which is so essential in this system of management, is more readily achieved with this type of feeding.

Meal is gradually increased to a maximum of 1½ lb per pig daily. From that stage onward the milk portion only of the ration is increased.

The greatest importance is placed on avoidance of overfeeding. The quantity given at each feed is so adjusted that 95 per cent of it is cleaned up quickly.

More liberal feeding has been found to result in scours. However, they can be quickly eliminated by reducing the milk fed and administering a proprietary aureomycin preparation.

The results obtained by this feeding method have been very satisfactory, and the fact that the growth rate is maintained to the finishing stages is indicated by output. About 20,000 lb of pigmeat was produced during the past season, when 129 cows were milked. This represents 155 lb of pigmeat (equivalent to two porkers) per cow.

Economics of System

Questions which will occur naturally to every practical farmer are:

"How much has been spent on meals to achieve this production?"

"Does it really pay?"

Though it is not primarily the amount of meal used but how efficiently it is used which governs profit, the results for the piggery discussed would indicate that meal feeding had been kept within economic limits. Meals represented about 15 per cent of the total food supply and cost £320 in the past season. When this amount is deducted from gross returns it still leaves a farm return of over £9 per cow from the skim milk.

Essentials to Success

1. Interest and determination to implement the plan thoroughly are more important than any superabundance of labour.
2. Leaving the litter on the sow until 28 days old.
3. Providing a warm bed in a correctly sized coop or kennel which the pigs can keep warm without artificial heat.
4. Ad lib. feeding to 8 weeks, using the appropriate special feeds in the early stages.
5. Cleanliness.
6. Treating otherwise as in ordinary rearing practice; allowing run-out on pasture when conditions are suitable from as early an age as possible.

◆

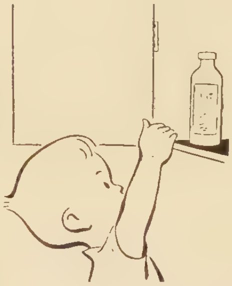
1080 POISON

Precautions

recommended on properties where the poison is used against animal pests

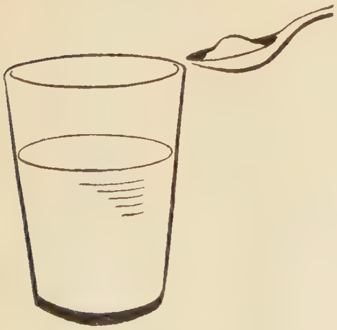
By the Departments of Agriculture and Health
and the Rabbit Destruction Council

- 1080 poison in sufficient quantity will kill man, animals, and birds.
- In the hands of trained men it does not present undue hazards to users.



THERE are no particular dangers to occupiers of properties where the poison is used, **but, as with all poisons, young children should in no circumstances be allowed access to bait materials poisoned with it.**

NO ANTIDOTE; BUT PROMOTE VOMITING There is no effective antidote for 1080 poisoning when symptoms have appeared, **but if any is swallowed by man or child, vomiting should be promoted by a tablespoon of salt or a teaspoon of mustard in a tumbler of warm water.**



The salt treatment can be repeated four or five times till vomiting occurs.

The patient should be kept quiet and immediate medical advice obtained.

NO ACCUMULATION IN BONES OR MEAT Though there is some experimental evidence that repeated small doses of 1080 can in some circumstances have serious or fatal effects on sheep, there is nothing to suggest that such doses cause any accumulation of the poison in the bones or meat of animals.

The poison is not stored in the bones of 1080-poisoned animals and if it is laid on pasture, it cannot render the plants themselves poisonous to grazing animals.

IN RUNNING WATER In the amounts used in rabbit and opossum eradication it is most unlikely to cause any poisoning danger to man or animal if baits fall in running water, but it would always be prudent not to use a water supply contaminated with large amounts of poisoned bait whatever the poison used.

AVOID INHALING DUST No poisonous fumes or vapour are given off from 1080-poisoned baits or even from 1080 powder, but in handling the powdered poison precautions must be taken to avoid inhaling any dust given off from it.

There are no dangers in handling the carcasses of 1080-poisoned animals, since the possibility of contaminating the hands with sufficient poison to be dangerous is extremely remote.

Any poison on the hands is removed completely by washing them in water, preferably hot.

RISKS TO DOGS **Dogs are killed** by eating the flesh of larger animals killed by large doses of 1080 and by eating the carcass, including the gut contents, of any 1080-poisoned rabbit.

The carcass of a sheep which had been missed during the muster before poisoning and killed by freshly laid bait would be more likely to kill a dog than that of a sheep dying after being returned to poisoned country. In the second case the intake of 1080 by the sheep would probably be lower, with less likelihood of the meat being toxic.

Clean mustering before poisoning is essential, not only to save unnecessary losses of sheep but to reduce the risk to dogs.

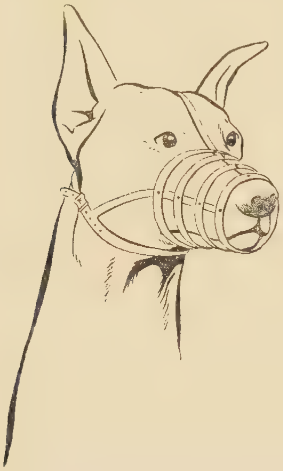
The poison does not break down in the carcasses of dead animals and hence dogs must be prevented from eating any 1080-poisoned animals, even when the carcasses are very decomposed.

PRECAUTIONS WITH 1080 . . .

In cold winter weather the carcasses of rabbits can remain dangerous to dogs for months.

A dog eating a poisoned rabbit may not show symptoms of poisoning for up to about 18 hours.

Unless dogs can be trained not to eat dead rabbits it seems logical, for their protection, for owners to feed them adequately after any 1080 poisoning operations on their own or neighbouring properties.



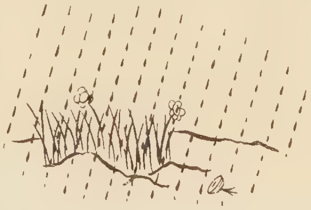
Muzzling of valuable dogs when 1080-poisoned rabbit carcasses are available to them should be considered.

It is suspected that some farm dogs have been poisoned by eating the dried-up paunch contents of dead rabbits which have been partially eaten by hawks, which do not eat the paunch contents, but tip them out of the carcasses.

Some normally quiet dogs which have been poisoned experimentally with 1080 have become very vicious shortly before death, and small children especially should be kept away from chained dogs showing fits after 1080 poisoning operations.

BAITS EATEN BY SHEEP AND CATTLE

Rabbit baits in sufficient quantity will poison **sheep and cattle,** and after 1080 rabbit poisoning **there can be no guarantee that sheep will be safe until there has been substantial rain,** certainly more than an inch, or the baits have rotted away.



In dry conditions carrot baits dry up, retain their poison, and are eaten by sheep when rain falls, causing the carrot to swell and become palatable.

With the level of 1080 used in carrot for rabbit poisoning, about 2 oz of the freshly prepared carrot will kill a sheep weighing 100 lb; after about an inch of rain, 8 to 20 oz of the swollen carrot would have to be eaten before death occurred.

The danger to sheep is greater when large amounts of carrot are lying about.

TESTING SAFETY OF COUNTRY

The advice of rabbit board supervisors about putting sheep back on poisoned country must be followed. Where there is some doubt a partial test of the safety of country for sheep could be made by putting back a few sheep for a week or so before the main flock. The point about carrot drying up and then becoming palatable after rain should be remembered. If rain should fall while the test sheep were on and no deaths followed in about two or three days, it could be taken that the country was safe. If no rain fell during the test period, the test would not be so reliable.

During poisoning operations care should be taken that grazing animals do not gain access to places where carrot is being poisoned and that poisoned baits are not accidentally spilt from vehicles or on landing strips where planes are loaded.

SAFETY PERIOD FOR SLAUGHTER

The meat of sheep grazing on country recently poisoned for rabbits or opossums is liable to contain small but harmless amounts of poison. From the point of view of public health, no foodstuffs containing even small amounts of poison should be eaten by man, and hence animals should not be slaughtered for meat for at least two weeks after animals have been returned to poisoned country.

1080 is the best poison weapon against the rabbit.

The Rabbit Destruction Council and the Departments of Agriculture and Health appreciate the extremely poisonous nature of 1080. As the result of experiments and experience it was found possible in 1958 to reduce the level of the poison in rabbit baits and thus, incidentally, further reduce any possible danger to humans.

Even before this lowering of the level of poison there had been no cases of 1080 poisoning in humans in New Zealand or Australia.

If this good record is to be maintained, there must be no relaxing of precautions in handling the poison, particularly by the men who carry out the actual poisoning operations.

* * *

Control of Crickets in Pasture

FROM October onward cricket eggs which were laid last season begin hatching and the young, which are very similar to but smaller than the adult of the species, begin feeding as soon as they emerge. Normally these small crickets do not cause appreciable damage, especially during spring when pasture growth is rapid. As the season progresses the crickets increase in size as does also their appetite.

Frequent rains will check a build up in numbers of crickets and at the same time keep pastures thriving so that the crickets do not become a problem. In dry weather the pest will thrive and pastures weaken so that severe damage may result.

Farmers are therefore urged to keep check on the position from now on and if necessary use insecticides to control the pest. However, treatment should be delayed as much as possible to catch as many of the later hatched crickets as possible, but should not be so late that pasture suffers or earlier hatched crickets are allowed to mature and lay eggs.

Normally insecticide should be applied in late January or February, depending on the season.

Dieldrin is the most effective material available and should preferably be applied at 6 oz of pure chemical per acre as a dust in fertiliser or lime, but pastures should not be grazed thereafter until rain falls. Alternatively baits consisting of 24 lb of bran, 4 lb of molasses, and 1/10 lb of 100 per cent DDT per acre may be prepared and broadcast over affected areas.

—C. M. BLICK,
Farm Advisory Officer,
Department of Agriculture,
Warkworth

Maori Farming at Its Best

["*Dominion*"

The late Lord Bledisloe, who as Governor-General of New Zealand, in 1932 presented the Ahuwhenua trophy for annual competition among Maori farmers on Maori land development schemes. This was only one of many directions in which Lord Bledisloe showed practical interest in New Zealand agriculture, which continued up until the time of his death, 23 years after the expiry of his term as Governor-General.

The Ahuwhenua trophy competition highlights the efforts of Maori farmers and shows that Maoris, if given encouragement and the opportunity, make just as good farmers as Europeans.

By A. V. ALLO,
Farm Advisory Officer, Department of Agriculture,
Tauranga, and judge of the 1958 competition for
the Ahuwhenua trophy for Maori farmers

MAORI farming at its best is seen during inspection of properties to determine prizewinners in the annual competition for the Ahuwhenua trophy, open to farmers on Maori land development schemes. Some are units of development blocks capable of providing a settler with a good income from the start, but other competitors had taken over run-down properties and were developing them partly through finance obtained from the Maori Affairs Department and partly out of farm income. Under such circumstances development is much slower, demanding a great deal of hard work and financial sacrifice before the farm attains a stage of development comparable to that of a unit settled as part of a development block.

The type of work being done by young Maori farmers today is well exemplified in the outlines which follow of farming on the properties of Messrs T. Haeata and W. J. Swinton, winner and second prizewinner in the 1958 competition.

Mr T. Haeata's Farm on Mangakino Block

Mr Haeata at work in his office.

MR T. HAEATA is farming a most attractive property of 133 acres that was originally part of the Mangakino development block. He has been settled on his property for five years. Though it is true that Mr Haeata has not had the struggle that other competitors have had to get himself established, he deserves full credit for the use he has made of his opportunities.

There are 122 acres in grass, subdivided into 17 paddocks, some of which need further subdivision. There is a well planned layout embodying the use of internal races, and when these are completed the property will be very easy to handle. The pastures are quite good, with white clover, cocksfoot, cowgrass, and perennial ryegrass the dominant species. Yorkshire fog has invaded some paddocks, the result possibly of too lenient a system of grazing. Mr Haeata applies 16 tons of superphosphate annually, half of it with cobalt and the other half with copper.

A practice that should be discouraged is the cutting of new pastures for hay. One 13-month-old sward had already had two cuts of hay taken from it. This is far too severe on new grass, which normally should not be cut until it is well established.

Excellent shelter belts of pines and lawsoniana are all well fenced from stock. Timber trees have been planted on a rocky outcrop unsuitable for grass.

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▲ Timber trees planted on a rocky outcrop unsuitable for grass on Mr Haeata's farm.

▼ Mr Haeata's property of 133 acres is being developed along sound lines and when the well planned layout is completed the farm will be very easy to handle.

A first-class Jersey herd of 67 cows is milked and 11 yearlings and 20 calves are also run. During the past four years production has been as follows:

Year	Total butterfat lb	Number of cows	Average per cow lb	Average per acre lb
1954-55	17,505	74	236	131
1955-56	15,418	75	206	116
1956-57	18,292	71	258	137
1957-58	19,555	67	292	160

Mr Haeata has recently built a new piggery in which are run 10 breeding sows. In the 1957-58 season the returns from pigs worked out at slightly over £5 per cow milked. On the other hand a profit of over £200 was made by buying in store lambs in January and selling them in autumn.

Excellent provision is made for wintering the dairy herd: 1,365 bales of hay were cut on the property and 430 bales were obtained by Mr Haeata in payment for work he did off the farm. All except 500 bales were saved in excellent barns, the balance being in a very well made stack. In addition 12 acres of grass was conserved as silage and 6 acres of white-fleshed turnips were grown for supplementary feed for autumn and early winter.

The home on the farm is neat and well kept and the lawns and garden well laid out. A full range of outbuildings is in excellent repair.

Mr Haeata has built himself a small office in which all records plus a plan of the farm were readily available. His system of keeping records could well be copied by most farmers, both Maori and European.

The work Mr Haeata has put into his property has been of a very high standard. Today he has a farm that has an assured future and that can stand comparison with any other property at a similar stage of development.

Mr W. J. Swinton's Farm at Whangamata, North of Waihi

THE property of 108 acres at Whangamata, about 18 miles north of Waihi, farmed by Mr W. J. Swinton was originally developed by the Maori Affairs Department out of fern and scrub after the Second World War and was settled by Mr Swinton, a returned serviceman, five and a half years ago.

The country is undulating to hilly. Cows are milked on 80 acres, while the balance, formerly grazed by his dairy stock, is now to be stocked with sheep. Pastures are somewhat variable in quality. Those at the front of the farm are very good, but the back paddocks have tended to revert to Yorkshire fog and weeds owing to difficulty of access and of management. Only recently Mr Swinton decided to give up trying to run cows on the whole of the farm, and the introduction of sheep to the higher back pastures should result in a marked improvement in their quality.

Two years ago many of the pastures were badly damaged by grass grub and DDT superphosphate was applied to bring this pest under control.

Fifteen acres of dairy pasture were sod seeded with good results in the autumn of 1958.

When the property was taken over by Mr Swinton there were many large patches of blackberry in the gullies and on several sidelings. These have been cleaned up by the intelligent use of stock during winter, hay being fed out on the areas, which were later topdressed. Though ragwort is a serious weed on some farms in this district, it is kept well under control on this farm.

Sixty acres were closed for autumn-saved pasture. The topdressing programme consists of 4 cwt per acre of 15 per cent potassic superphosphate yearly on the dairy pastures and 3 cwt of serpentine superphosphate per acre on the higher country.

The property is subdivided into 18 paddocks, of which 16 are on the dairy country. The two sheep paddocks have since each been halved. Fences and gates are in splendid condition, and there is a central farm race on the dairy portion in spite of the hilly country.

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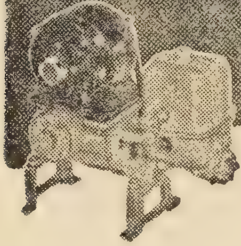

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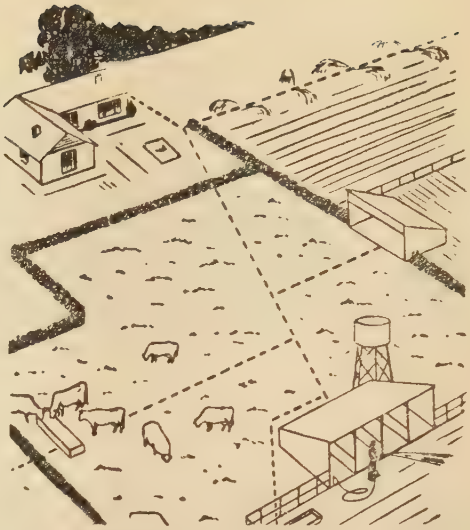

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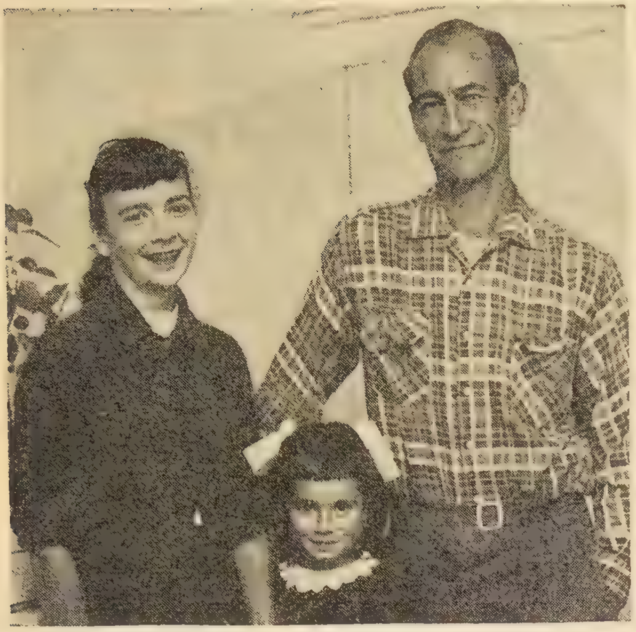
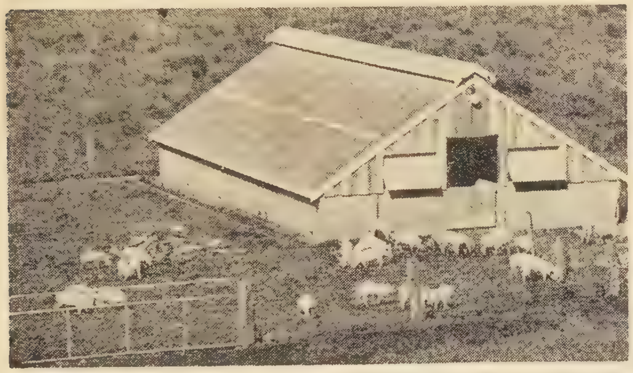
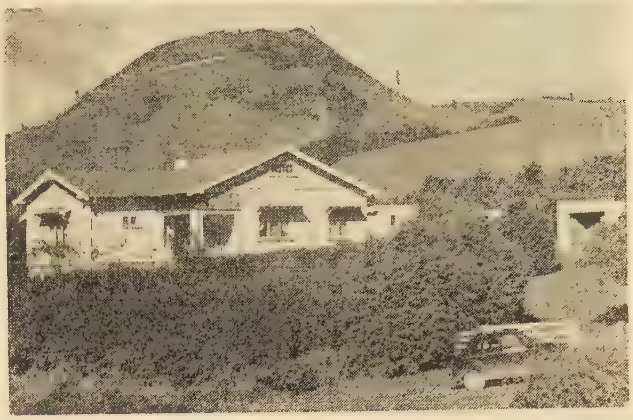
EXAMPLES OF MAORI FARMING ON MODERN LINES



Mr and Mrs Swinton and their daughter.

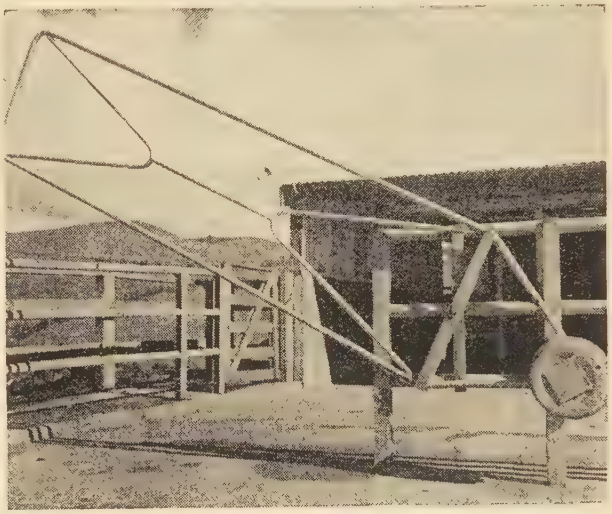
▼ The simple but efficient piggery on Mr Swinton's farm.





The Swintons' homestead. The hill behind the house is on neighbouring property.

▼ Novel type of swing gate in the cowshed.



Mr Swinton has erected over 1¾ miles of fences, has laid out more than a mile of water pipe, and has supplied water to every paddock. Most of the fencelines have been planted in barberry hedges, some of which are now fence height.

A herd of 54 good-type Jerseys is carried on the farm, with 20 yearlings and 15 calves. Mr Swinton has joined the A.B. scheme, and the improvement in the quality of the cows should be marked over the next few years. Butterfat returns have been as follows:

Year	Total butterfat lb	Number of cows	Production per cow lb	Production per acre lb
1955-56	14,196	54	263	142
1956-57	11,906	58	205	109
1957-58	14,666	54	271	136

In 1958 about 100 wether lambs were run at the back of the farm and in the same year five breeding sows were run in a simple but efficient piggery. Returns from the pigs are not high, being under £6 per cow milked, but with the purchase of six national hybrid sows an improvement should be made. A feature of Mr Swinton's pig management is that he tries to arrange farrowing dates to avoid having to carry stores over winter.

A thousand bales of reasonably good hay are cut off the farm yearly. No silage is made, as the surface of the paddocks at present is too rough to permit the use of a buckrake. The provision of adequate winter feed is made more difficult because only 30 acres of the property are sufficiently flat to be cut for hay. The balance of the farm is far too hilly. Mr Swinton has decided to winter his cows on one of the flatter paddocks, which will then be cropped with white-fleshed turnips for summer and autumn feed, after which it will be sown back to grass. After a few years there will be paddocks sufficiently smooth for silage to be made.

The well kept house and garden make this a very attractive property. Buildings are in good repair, the cowshed in particular being in splendid order. Provision could possibly be made for increased storage of hay, which at present is kept in the implement shed. Farm machinery has to be kept in the open, protected by tarpaulins.

Many more cases could be given of Maori farmers who are farming on modern lines and who are keen and energetic, often in spite of great physical and financial difficulties.

Sole selling agents: Neill, Cropper & Co. Ltd., P.O. Box 9, Auckland: P.O. Box 583, Wellington: P.O. Box 1378, Christchurch: P.O. Box 703, Dunedin.

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- Cutter bar raised and lowered by hydraulic lift.
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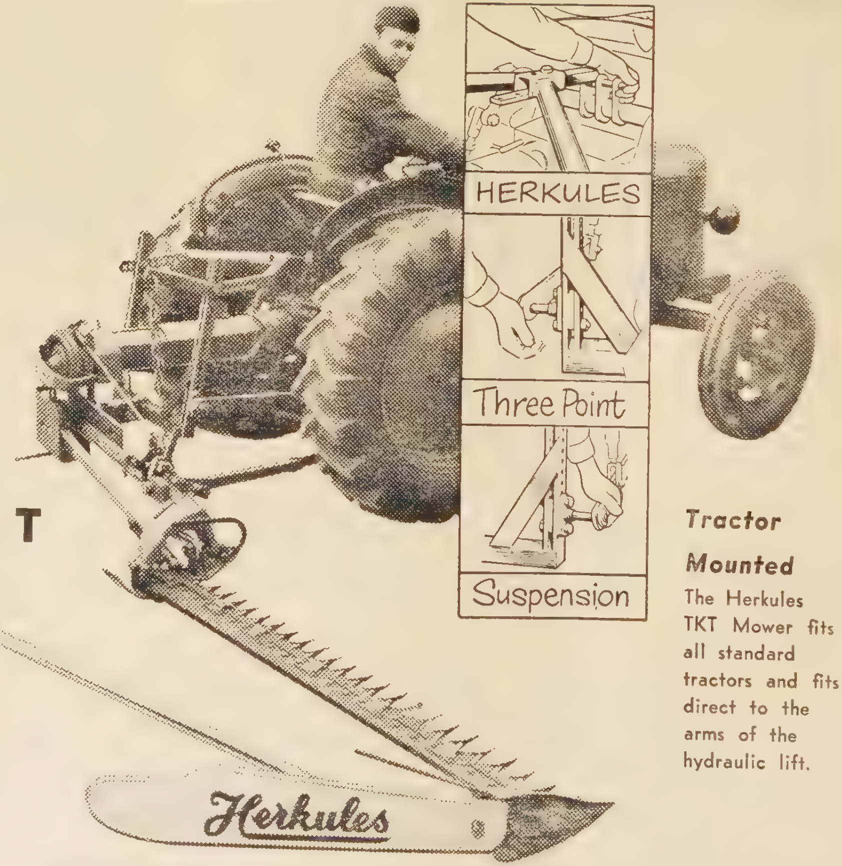


Tractor Mounted

The Herkules TKT Mower fits all standard tractors and fits direct to the arms of the hydraulic lift.

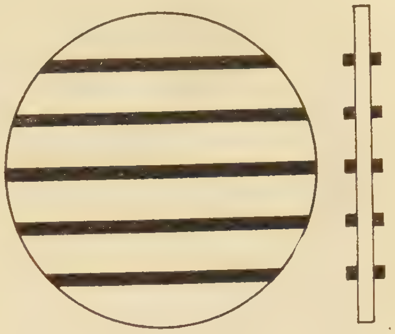
Cappings Press for Heavy-bodied Honeys

THE separation of heavy-bodied honeys such as manuka from wax cappings and unmarketable comb has always been a problem for beekeepers in areas which yield this type of honey. The application of heat, which is used in varying forms for the recovery of lighter-bodied honeys, is generally unsuitable with jelly-like honeys, which overheat and caramelise very readily and the natural, pleasant flavours of which are easily impaired. As most forms of these honeys do not drain readily and are unsuited to heat treatment, the application of pressure is the only means by which they can be satisfactorily recovered from cappings and trimmings without loss or impairment of flavour and colour. In this article C. G. Rope, Apiary Instructor, Department of Agriculture, Auckland, describes a compact, simply constructed press which is suitable for this operation.

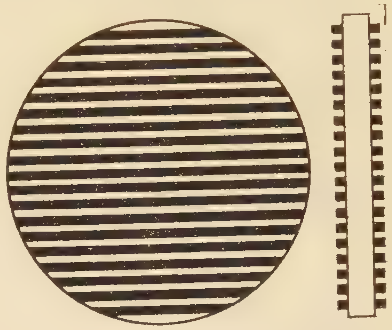
VARIOUS designs of presses are used in New Zealand for recovering heavy-bodied honeys from wax cappings. One type, deriving its pressure from a 12 ft weighted beam used as a lever, was described by D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, in the June 1951 issue of the "Journal". The spring press illustrated below takes up much less space than the beam-type press, but uses a similarly constructed uncapping basket and tray.

The materials required are:

One tinned metal tray 22½ in. in diameter x 6 in. deep fitted with a 1¼ in. honey gate.



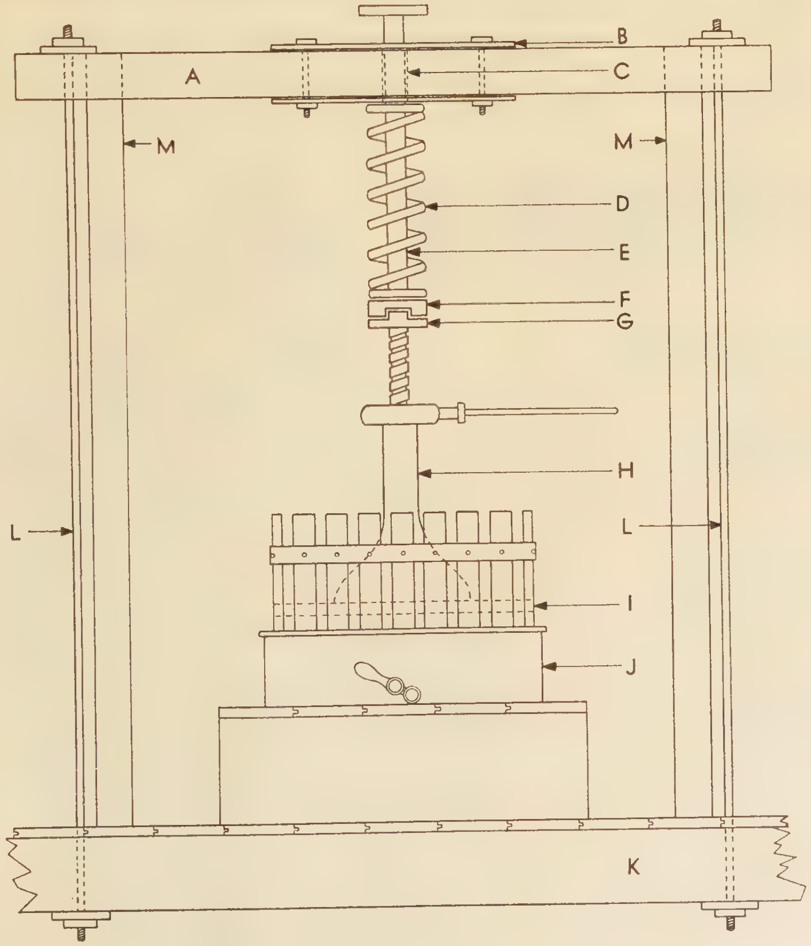
Plan and sectional view of circular bottom board with supporting crossbars.



Plan and sectional view of wooden follower, showing arrangement of wooden slats.

One circular bottom board (top illustration above) 21¾ in. in diameter made of 1 in. timber with 5 supporting crossbars, each ¾ in. x ¾ in., attached to both sides of the board. The board is covered on one side with a piece of wire-type queen excluder.

One circular follower board (bottom illustration above) 19½ in. in diameter,



Parts of Press

A—Anchored beam
B—Strengthening guide posts
C—Guide hole through A and B
D—Coiled steel spring
E—Steel shaft
F—Recessed foot plate welded to E
G—Top mounting of jack adapted to fit recess in F
H—Long reach tractor jack
I—Top follower board
J—Uncapping basket and tray
K—Floor joist
L—Steel anchor rods
M—Wooden supporting posts

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VITAMIN B²	(Riboflavin)
VITAMIN E	essential to young and breeding stock.
VITAMIN K	to help prevent blood spot in eggs.

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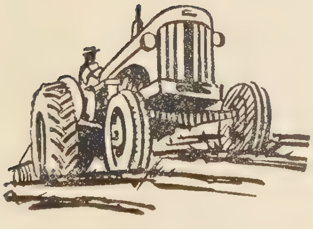

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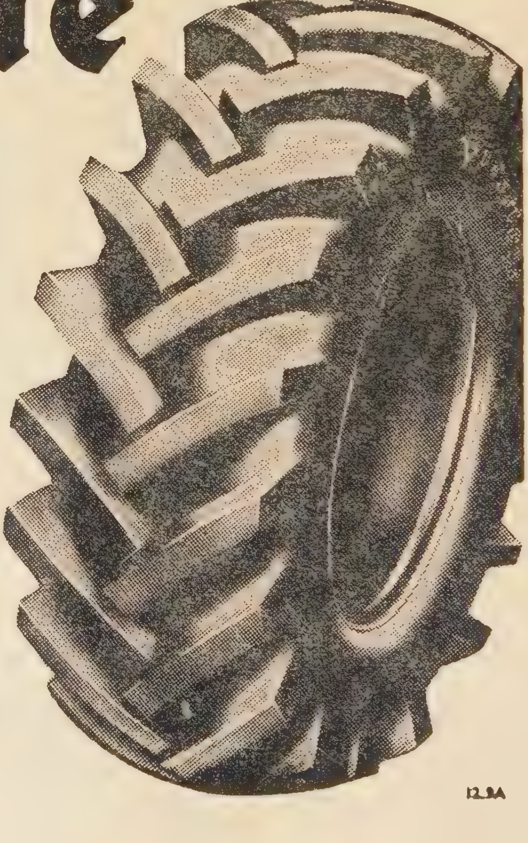


12.9A

made of 1½ in. timber, and strengthened on both sides by ½ in. x ½ in. wooden slats set ½ in. apart as illustrated. The follower board is also covered on one side with wire-type queen excluder.

One basket 21¾ in. in outside diameter and 12 in. deep. This is constructed of top bars of Hoffman frames, with the grooves widened to ⅜ in. and deepened to ¼ in., which are supported and held in shape by two tinned metal hoops each 2 in. wide.

One wooden uncapping bar 22½ in. x 2 in. x 1 in. with a central spike on which to pivot the frames of honey.

Construction of the Spring Press

Fig. 3 shows how a strong frame is built in which the uncapping basket and tray are placed. The top member of this frame acts as a solid bearing surface which supports a strong coil-type steel spring. The spring fits loosely round a steel shaft which slides through a guide hole in the top member. This permits a rise and fall action of the shaft, without side movement, and allows a positive downward pressure to be exerted by the spring on a plate welded to the bottom of the shaft.

If it is found that one spring provides too little pressure at this point, extra pressure can be obtained by inserting a second spring of narrower diameter inside the first. The first spring chosen should be of sufficient diameter to allow this to be done. Use of short springs in this construction is advisable, as the various components of the press tend to move out of alignment when very long springs are used. The spring usually used is of the type now in the front suspension of motor vehicles.

A detachable long reach jack is used to compress the springs. Five ton, long reach tractor jacks are quite suitable for this purpose. The top mounting of the jack should be adapted to fit neatly into a recess in the plate welded to the bottom of the spring-loaded shaft so that these two components will not slip out of place during operation.

Method of Use

The circular bottom board, with the excluder side upward, is placed in the tray, and the wooden slat basket is set on top of the board. The basket is then lined with well washed scrim or hessian and the uncapping bar is placed in position. Cappings may fall directly into the basket, which is of sufficient size to hold cappings from approximately 20 supers, about four hours' work for one man.

The follower board, with the excluder side downward, is then placed on top of the scrim-wrapped cappings and the filled basket and tray are placed directly beneath the spring-loaded shaft.

The jack is then positioned between the follower board and the spring-loaded shaft and is extended as far as possible. This action compresses the spring, which then exerts sustained, firm pressure through the jack on to the follower board. As continuous pressure is imposed by this means on the contents of the press, it should require no further attention until the honey has been separated from the wax and the wax "biscuit" is ready for removal.

The condition of the honey recovered in this way can be greatly improved by passing it through a 40 mesh to the inch cylindrical strainer such as that described in the April 1951 issue of the "Journal". This type of strainer will remove many of the air bubbles and foreign matter incorporated into the honey by the press.

Repairing Honey Combs

EACH year beekeepers cull a number of drone and mice-damaged combs unfit for further use in the brood chamber of hives. Repairing such combs may not be considered worth while, but if a comb is only slightly damaged or has a small area of drone cells, repairs can be made in a few minutes. Often toward the peak of the season there is a shortage of good combs and a little time taken to repair old combs could save the day and save considerable waste.

The following method is used by Mr R. C. Abernethy of Owaka whereby one old comb can be used to repair several damaged ones.

The damaged area of comb and frame wire is cut out with a sharp knife. Next place the comb over other worker cell comb being used for repairs and trace the size of piece required. The job is completed when the traced piece of comb has been cut and neatly pressed into place, as the bees will do the final cementing of joints.

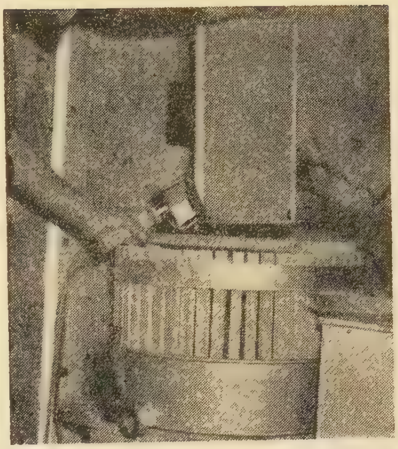
It should be noted that repairs using comb foundation are rarely successful where the patch exceeds 2 sq. in. For the larger patches drawn comb should be used.

—D. W. A. SEAL,
Apiary Instructor,
Department of Agriculture,
Invercargill

Obtaining Best Results

Attention to the following points will ensure that the best results are obtained.

- Better separation of honey from wax cappings is obtained when the combs are warmed up to 93 degrees F in a comb-warming room before extraction.



CAPPINGS PRESS

Comb in position for removing cappings into the basket and tray of the uncapping can and cappings press.

- Uncapping of the combs should always be done as lightly as possible to minimise the volume of cappings to be pressed. This will allow each pressing to be of longer duration, which will lessen the amount of honey retained in the wax "biscuits".

- The volume of cappings to be pressed can if necessary be considerably reduced by allowing them, as they fall from the knife, to pass quickly over a sloping tray heated from beneath by a steam jacket. This heating, which must be carefully controlled to prevent damage to the honey, compacts the cappings and facilitates removal of the honey. When this practice is adopted the warming tray must be sloped sufficiently to prevent the cappings from remaining stationary on the hot surface.

- In this type of press if dimensions of the baskets are increased beyond a certain point, efficiency rapidly decreases. In practice it has been found that "biscuits" derived from baskets exceeding 21¾ in. in diameter and 12 in. in depth contain excessive quantities of waste honey. To deal with large quantities of cappings it is therefore advisable to use duplicate units not exceeding the above dimensions rather than to operate a single press of very large capacity.

Acknowledgment

Much information in this article was kindly provided by Mr G. B. Sharp, Matakana, and Mr D. C. Stewart, Kaiwaka.

Australian Livestock Specialist in New Zealand

MR MARSHALL R. IRVING, chief of the Division of Animal Industry of the Department of Agriculture, South Australia, was in New Zealand in September after visiting the United Kingdom and North America on his return from the International Veterinary Congress at Madrid, to which he was a Commonwealth delegate.

Mr Irving's chief interests during his tour were inquiry into methods of control and recent advances in research into major animal diseases that are of special quarantine interest to Australia; study of the organisation and conduct of artificial breeding of dairy cattle, which has just been introduced in South Australia; and inquiry into the marketing of export lamb and beef, standards of quality and grade, methods of preservation and transport, and problems of supply.

Mr Irving visited the Department of Agriculture's Animal Research Stations at Wallaceville and Ruakura, Massey Agricultural College, the New Zealand Dairy Board's Artificial Breeding Centre at Newstead, and meat works in the North Island.

On a visit to the Smithfield meat market in London Mr Irving said he saw, within a radius of about 20 yds, meat from 14 different countries presented for sale. He described the United Kingdom meat market as a "harsh and critical" one and was impressed by the need for countries exporting to the United Kingdom to do the utmost in "merchandising" their produce. It was not enough to produce meat for overseas markets; exporting countries' approach to marketing had to be reorientated to regard the real work as beginning after production. It was particularly important for countries furthest away from the United Kingdom market to overcome disadvantages of lack of continuity of supply. Goodwill for a particular country's produce that was built up by publicity and salesmanship was rapidly lost if the product was periodically unobtainable.

Mr Irving.

Publicity for New Zealand lamb in United Kingdom retail shops was particularly impressive in its impact at the crucial time when customers were making their selection and purchases. Wholesalers, however, emphasised the probability of an oversupplied lamb market and the better prospects for increased supplies of high-quality beef.

Tractor Safety Film "We Lead the World"

"WE Lead the World", the tractor safety film made by New Zealand's National Film Unit with the cooperation of the Department of Agriculture, recently won an award of merit at the Chicago festival of safety films. A letter congratulating the makers on a fine production and its contribution to the cause of accident prevention states that there were 66 entries and that the standard was excellent.

"We Lead the World" was directed by Philip McHale from a script written by the Department of Agriculture. Advisers from the Department of Agriculture were H. W. T. Eggers, E. B. Glanville, C. M. B. Olivecrona, J. O. Brasell, and R. G. Burton.

The original script was written by C. J. Crosbie after consultation with two well known South Canterbury farmers, Messrs C. E. Wright and N. Hayman, who have had a long association with the promotion of tractor safety.

Copies of the film are in the Department of Agriculture's extension film library, from which borrowings may be made **only** by Departmental officers. Organisations, particularly farmer groups, interested in the promotion of tractor safety and wishing to see the film should make arrangements for screenings through officers of the Department of Agriculture at the nearest branch office.

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Vaccination Against Contagious Abortion

APPLICATIONS by farmers for vaccination of their calves against contagious abortion in 1960 are due now. Applications should be sent in as early as possible so that vaccinating officers can arrange the work efficiently.

Members of veterinary clubs should apply to the secretary of their club and other farmers should apply to the nearest Livestock Instructor of the Department of Agriculture or private veterinary surgeon. Applications to Livestock Instructors must be accompanied by a cash payment of 2s. per calf. Application forms can be obtained from any Livestock Instructor.

The closing date for applications for dairy calves is 14 January and for beef calves 29 July. The charge for vaccination is 2s. per calf irrespective of the number.

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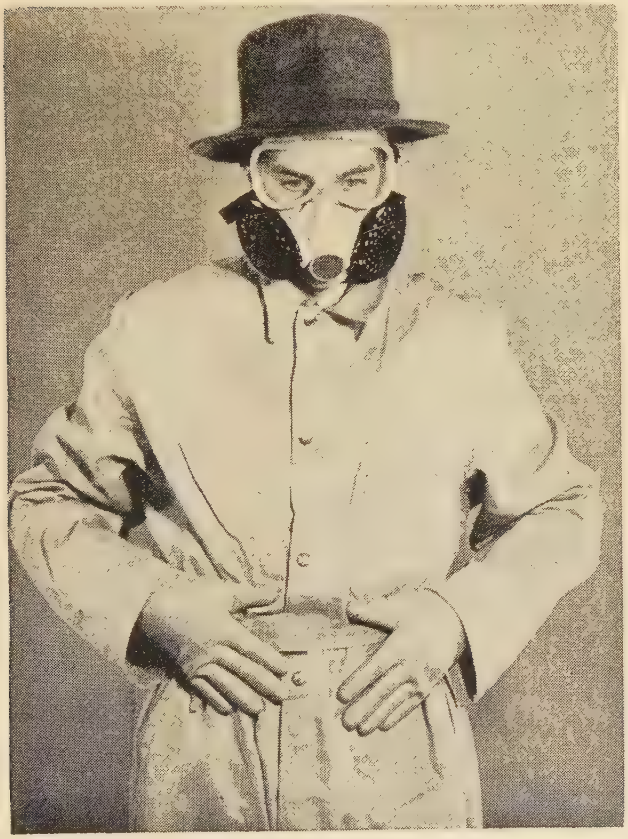
Sheep Dusting and Spraying—Safety Precautions

JOINT STATEMENT BY DEPARTMENTS OF AGRICULTURE AND HEALTH

IN the treatment of sheep with dieldrin or aldrin for external parasite control, **any risk to the operator of poisoning can be almost entirely eliminated by the adoption of recommended safety precautions.**

The insecticides dieldrin or aldrin can prove poisonous to man if absorbed in sufficient quantity.

The materials can enter the body via the mouth and the nose, but in practice the greatest risk is by absorption through the skin.



Protective clothing for dusting.

The amount absorbed depends on

The area of skin that is exposed

The concentration of the insecticide in the material touching the skin

The frequency of exposure

The length of time that the skin remains contaminated

The hazards are greatest for contractors who are exposed to the insecticides frequently.

For farmers who are exposed only once or twice a year the risk of poisoning is much less.

Respirators

There are a number of suitable respirators available for this type of operation. Those which are approved by the Department of Health are listed in their occupational health bulletin "Notes on Agricultural Respirators", copies of which are available on application to the Medical Officers of Health.

Symptoms of Poisoning

The symptoms of poisoning by dieldrin and aldrin include headache, giddiness, loss of appetite, vomiting, and general malaise.

Operators who experience these early warning symptoms should obtain medical advice, because if the early symptoms are ignored, more severe effects such as convulsions may develop

Symptoms similar to those mentioned may arise from causes other than insecticide intoxication and therefore medical attention should be sought without delay so that a correct diagnosis may be made

Dieldrin and aldrin are absorbed by and stored in the body fat. A decrease in weight many months after use can cause release of the chemicals into the system with resultant symptoms

Danger to Children

Children are very much more susceptible than adults and must be kept away from the vicinity of operations.

Farmers

Farmers should observe the following precautions.

1. Arrange the machine so that the operator can stand upwind from the race.
2. Wear dustproof or waterproof headgear and an approved respirator when exposure to dust or spray is unavoidable.
3. Wear overalls, which must be washed in hot water with soap or detergent every day after use.
4. Wash hands thoroughly after each mob has been treated, as absorption may be increased when the operator is perspiring.
5. Wash completely as soon as possible after the operation has been completed or at the end of each day's run.
6. Water and soap should be available on the job so that hands can be washed before eating or smoking.
7. Dust and liquid concentrate should not be allowed to come in contact with the skin. Rubber or plastic gloves should be worn and care should be taken that the insides of the gloves are not contaminated. If liquid concentrate is accidentally spilt on the hands, they should be washed. Clothing contaminated with concentrate should be changed immediately.

Contractors

The increased exposure to the insecticides experienced by contractors demands the adoption of additional precautions to those necessary for farmers, who are exposed only at less frequent intervals.

1. Full-length overalls should be worn. These should be washed after each day's work in warm water with soap or detergent and they should be dry cleaned periodically. Open-necked garments should be kept buttoned.
2. Goggles should be worn in addition to a respirator.
3. Headgear must be worn and a broad-brimmed hat is preferable to a beret, as this gives added protection to the exposed skin of the face and neck.
4. Where practicable, work may be restricted to the early morning or late afternoon to avoid working during the hot part of the day, when protective clothing might be extremely uncomfortable.

It is stressed that these precautions should be rigidly adhered to, as small amounts of insecticide can accumulate in the body after each exposure and it is excreted very slowly.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during December as follows:

1YA Auckland, 7.45 p.m.

3 December—"Increasing Poultry Profitably", by B. Parkin, Poultry Instructor, Department of Agriculture, Papakura.

10 December—"Aphids and Caterpillars in Crops", by D. M. E. Merry and D. L. Janett, Farm Advisory Officers, Department of Agriculture, Pukekohe.

1YZ Rotorua, 7.15 p.m.

2 December—"Incidence of Feed Taints Relative to Butter Quality", by I. Willis, Dairy Instructor and Grader, Department of Agriculture, Hamilton.

16 December—"Unthriftiness in Calves and Hoggets", by J. Young, Veterinarian, Department of Agriculture, Tauranga.

2ZA Palmerston North, 12.36 p.m.

7 December—"Hydatids", by J. R. Heawood, Livestock Instructor, Department of Agriculture, Palmerston North.

21 December—"Farming Trends in the Manawatu", by J. A. Graham, Instructor in Agriculture, Department of Agriculture, Palmerston North.

2YZ Napier, 7.10 p.m.

1 December—"Water Conservation", by S. T. Anaru, Soil Conservator, Department of Agriculture, Hastings.

15 December—"Farming Editor's Summary", by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings.

2XG Gisborne, 8 p.m.

22 December—"Stockowners' Question Time", by E. B. Smythe, Livestock Instructor, Department of Agriculture, Gisborne.

2XA Wanganui, 8 p.m.

3 December—"For the Country Woman", by Mary MacDonald.

17 December—"Sheep and Wool Notes", by P. C. Marshall, Sheep and Wool Instructor, Department of Agriculture, Wanganui.

3YA Christchurch, 12.20 p.m.

7 December—"Pointers in Handling Certified Seed", by P. R. Barrer, Farm Advisory Officer, Department of Agriculture, Christchurch.

21 December—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

Regular Sessions

1YA Auckland, Mondays at 12.36 p.m. ("Country Journal", including "Report from Ruakura"), Tuesdays, Wednesdays, Thursdays, and Fridays at 7.45 p.m. ("Country Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

1XN Whangarei, Mondays at 8 p.m. ("Northland Stock Market Report" followed by "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 12.33 p.m. ("Farm News").

1XH Hamilton, Mondays at 12.36 p.m. ("For the Farmer", excluding first Monday in month and public holidays), Wednesdays at 12.33 p.m. ("Report from Ruakura").

1YZ Rotorua, Wednesdays at 7 p.m. ("Bay of Plenty Journal"), Thursdays at 12.33 p.m. ("News for the Farmer").

2YZ Napier, Tuesdays at 7.10 p.m. ("The Hawke's Bay Farmer"), and Thursdays at 12.33 p.m. ("News for the Farmer").

2XG Gisborne, Tuesdays at 8 p.m. ("Farm Session").

2XP New Plymouth, Thursdays at 8 p.m. ("Farm Session").

2XA Wanganui, Mondays at 8 p.m. ("For the Man on the Land"), Tuesdays at 8 p.m. ("Farm Supplement"), and Thursdays at 8 p.m. ("Farm Topics").

2XN Nelson, Thursdays at 8 p.m. ("Nelson Farm Topics").

2ZA Palmerston North, Mondays at 12.36 p.m. ("Country Digest") and Fridays at 8.30 p.m. ("Country Digest", including Feilding stock market report).

2YA Wellington, Mondays, Tuesdays, and Fridays at 7.10 p.m. ("Farm Session"), Thursdays at 12.33 p.m. ("News for the Farmer").

3YA Christchurch, Mondays at 12.20 p.m. ("Country Session"), Thursdays at 12.33 p.m. ("News for the Farmer") and 7.10 p.m. ("Home Paddock").

3XC Timaru, Wednesdays at 8 p.m. ("Farmers' Weekly News Service") and Saturdays at 10.30 a.m. ("Country Mailbag").

3YZ Greymouth, Mondays at 12.36 p.m. ("Farm Session") and Thursdays at 12.33 p.m. ("News for the Farmer").

4YA Dunedin, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m. ("News for the Farmer").

4YZ Invercargill, Mondays at 12.36 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m. ("News for the Farmer").

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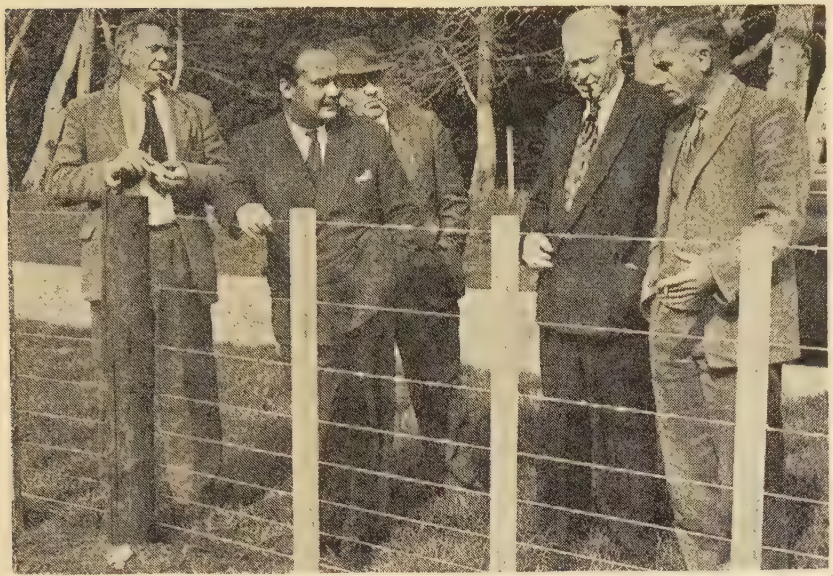
U.K. Minister of Agriculture in N.Z.



["*Waikato Times*"

THE United Kingdom Minister of Agriculture, Mr John Hare, was in New Zealand for about a fortnight in August and September at the invitation of the New Zealand Government. He is shown above (second from left) at the Department of Agriculture's Ruakura Animal Research Station. Behind him is Mr W. E. Jones, Deputy Director of the National Agricultural Advisory Service, Great Britain. On his right is Dr C. P. McMeekan, Superintendent, Ruakura, and on his left Mr P. W. Smallfield, Director-General of Agriculture, and Dr L. R. Wallace, Senior Principal Scientific Officer, Ruakura.

THE first British Minister holding the portfolio of Agriculture to visit this country, Mr Hare had discussions with the Prime Minister, Mr Nash, the Minister of Agriculture, Mr Skinner, and visited farms, agricultural research institutions, agricultural colleges, meat works, and dairy factories in both islands.

Mr Hare has a mixed farm in East Anglia on which he runs a Guernsey dairy herd and pigs and does some cropping.

"I came here to learn", he told a Press conference in Wellington toward the end of his visit, "and I have had a valuable and instructive time. . . . I have certainly learnt a great deal".

Practical Research

Impressions commented on by Mr Hare were:

Our getting, in New Zealand, three months' more use out of grass than was general in the United Kingdom;

The extent to which New Zealand had made use of "problem" soils; the way in which deficiencies had been determined, corrected by the use of minor elements, and the land brought into production;

The very important factors, in our use of grass, of regular topdressing and controlled rotational grazing;

"I saw graphically illustrated at Ruakura and on farms I visited what controlled rotational grazing can do," said Mr Hare. "We are not unfamiliar with the practice at Home, but I have not generally seen it work as well as it does here.

"I was particularly impressed with the practical application of science at Ruakura, where all work is being carried out on small farm units so that the scientific and practical are being studied at once. New Zealand is well served by its agricultural scientists and teaching colleges. Extension services seem to be disseminating widely the knowledge arising from research into how to farm grass, and a lot of your leading farmers seem determined to apply the proven principles".

Interest in the possibilities of our system of lime pelleting of seed in the regrassing of Welsh hill country was expressed by Mr Hare. He was struck, too, by the great advances made in bloat control to the stage where there was in commercial manufacture a product that could be sprayed on pastures.

Marketing Problems

In referring to the problem of how New Zealand could deal with the increasing production she was going to get from the application of improved techniques, Mr Hare said there was "a limit to the amount of lamb we can eat at Home," and if he were farming in New Zealand he would be tempted to increase the ratio of beef to sheep, as the market for beef in the United Kingdom—and that meant high-quality chilled beef—could be built up.

Expressing appreciation of the opportunity to return visits made by New Zealand Ministers of Agriculture to Britain, Mr Hare said there was undoubted value to be got from authorities from the two countries getting together to discuss problems of price fluctuations, particularly for dairy produce.

"Butter is one of the most difficult commodities", he said. "I don't think a managed market would work, and I don't think it would be in the interest of the New Zealand producer. The United Kingdom still has the 'blunt instrument' of its anti-dumping laws. There is a danger that butter prices might go too high and the New Zealand dairy industry lose customers. Hence the United Kingdom's recent liberalising of her attitude to American butter imports in an attempt to stabilise the market".

The increasing need for market research was emphasised by Mr Hare. The feeling seemed to be widespread that there should be sustained and increased inquiry into the reasons for consumers' demand for certain products and why they were prepared to pay higher prices for some lines than for others. Such research could have an important bearing on success in marketing increased production.

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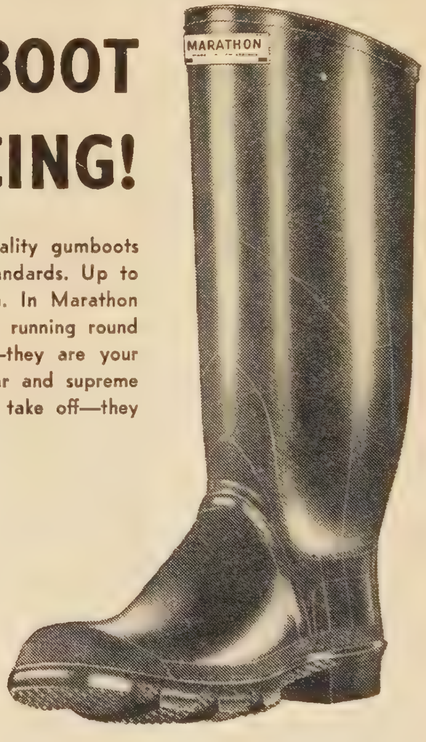

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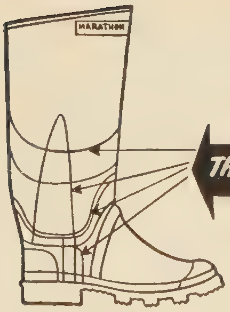

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The Home Garden in December

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

GROWTH should be vigorous in the well-cared-for garden in December, but of weeds as well as vegetables, so that a sharp hoe should be used regularly between rows. Except in the warmer districts, which have a long comparatively mild period between late autumn and early winter, ground preparation for, or planting out of, winter greens should be high on the list of jobs for late December.

WEEDS in established crops should be eradicated, as they deprive plants of food and moisture and often allow insect pests and diseases to carry over from season to season. Many new weedkillers effective for certain crops have been developed in recent years, but in the home garden hoeing is usually still the most effective means of control.

Liquid manure can be applied to most crops lacking plant food, and where necessary watering should be attended to. Water is particularly important to beans, lettuce, and celery.

Broad beans attacked by the fungous disease rust should be sprayed with zineb regularly. Rust is readily recognised by its rusty pustules and should not be confused with chocolate spot, a fungous disease which causes chocolate-coloured blotches on the leaves. Chocolate spot can readily be controlled by copper or thiram sprays.

Celery should be sprayed with captan or a substitute even before leaf spot appears. In the more humid districts potatoes should be sprayed with bordeaux mixture or copper oxychloride or zineb for protection against late blight. The tubers should be kept well covered by moulding the soil to as sharp a ridge as possible.

Tall tomatoes need pruning, staking, tying, and, except in some southern districts, spraying with DDT against caterpillars and with bordeaux mixture or copper oxychloride or suitable Government-certified therapeutant to control fungous disease.

Kumara runners should be lifted periodically to prevent them from rooting. If they are lifted regularly, the vines will not mat together and are much easier to turn. In some seasons kumaras will succeed in warm, sheltered areas as far south as Christchurch.

Asparagus

Too heavy cutting of asparagus will reduce later yields and many beds have been ruined in this way. Harvesting is usually done by cutting the shoots or spears a little below the ground with a sharp knife or asparagus cutter.

It is safe to cut half as deep as the top of the crown is below the ground; if the crown is about 4 to 5 in. down, the spears should be cut about 2 in. below the surface. Cutting is usually begun when the spears are 6 to 8 in. above the ground. The spear is first gently pulled to determine its position and, by experience, it can be cut with one thrust without damage to other spears. In loose soil spears can be broken off, but this may damage the crown.

The butts of spears should be trimmed off, though the pieces can be used for flavouring soup. Cutting

SOWING AND PLANTING

Successional Sowings

Dwarf beans, beetroot, carrots, celeriac, Chinese cabbages, kohl rabi (where ground is not likely to dry out), lettuces, mustard greens, New Zealand spinach, radishes, silver beet, onions for salads, turnips.

Other Sowings

Parsnips (if seed has not yet been sown; it is now getting late in southern districts); swedes (sowing can be deferred in warm, dry areas); peas (where soil does not dry out).

Seedings or Tubers Which Can be Set out

Celery (self-blanching and ordinary green or white); tomatoes (where plants have not yet been set out and in favourable situations only); lettuce (where conditions are not too hot and dry for transplanting); summer cabbage; cauliflower.

Winter greens (except in mild northern districts) such as broccoli or winter cauliflower and savoy cabbage (several varieties of each to ensure succession); brussels sprouts; kale or borecole; leeks; cabbage for pickling.

A small planting of potatoes can be made, where ground is likely to remain moist enough for good growth; to provide new potatoes in late autumn or early winter.

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should cease early where conditions are dry or if the soil is poor.

Onions

Where onions have not yet reached maturity weeds not only use up plant food, but when conditions are damp tend to hinder ripening of the bulbs. Though some onion crops are ready for harvesting, those that were planted late or are still growing well should be kept free of weeds and pests and diseases.

Parsnips

Though parsnips are not usually lifted until early winter, it is rather late for them to be sown in most southern districts. They can still be sown where, as in northern districts, the autumn is sufficiently long to enable the plant to develop fully before winter stops growth.

Hollow Crown and Oxheart are popular varieties.

Potatoes

December is rather late for planting potatoes, and the success achieved will depend mainly on the district or dryness of the season. It is usually advisable to choose an early or second-early variety for such a late planting.

Potatoes need a well drained soil rich in humus. If fertiliser is required, it can be supplied by dusting a mixture of 3 parts of superphosphate and 1 part of sulphate of ammonia in the trench at 6 to 12 oz to every 6 yd of row before planting.

Cut or whole tubers can be planted 10 to 16 in. apart in a trench 4 to 5 in. deep taken out with a hoe. For early and very late planting a close spacing can be adopted.

The moulding or earthing up of the main potato crop and the digging of the early crop should now be proceeding. The ridges should be finished off to as sharp a point as possible to prevent the spores of potato blight from being washed down by rain to infect the tubers. It is not advisable to earth up when the soil is wet. Blight attack depends largely on the weather. Frequent spells of moist, warm weather are conducive to attack and where the weather favours the disease preventive spraying with bordeaux mixture, copper oxychloride, or zineb is advisable.

Potato blight is first seen as irregular, dark brown, water-soaked areas on leaves and stems. The leaves become limp and there may be mildew on the undersides in moist weather. The stems blacken and decay. Tubers should not be lifted when there are blight spots on the leaves, as tubers may become contaminated and later may rot in storage. Infected haulms should be removed at least 10 days before digging. If there is a doubt about the presence of blight on the tubers, they should not be stored.

[*Green and Hahn*

Celery can be set out in a trench in December.

Potato Scab

There are two types of scab which infect potatoes, ordinary scab and powdery scab. They do not differ greatly in appearance, though powdery scab may develop a canker, which is much more serious. Generally scab shows as scabby spots varying from roughened, shallow depressions to corky protrusions. Barriers of cork are laid down by the tuber in an effort to exclude the scab-producing organisms. Scab may reduce the yield by 10 per cent.

Control consists of avoiding soils which have recently been heavily limed or to which heavy dressings of organic manure have recently been applied. Heavy dressings of organic matter applied the previous year so that they are thoroughly decomposed are satisfactory.

Very acid soils inhibit the development of the parasite, but apart from soil acidity the development of potato scab is influenced by soil moisture and temperature. Its development is usually favoured by conditions where soil moisture is slightly below that giving good growth.

Rhubarb

Treatment of the main varieties of rhubarb is somewhat similar to that recommended for asparagus. Harvesting of the main crop should not last beyond about eight weeks, though this depends on the vigour of the plants, the amount of harvesting done, and the moisture content and fertility of the ground. After harvesting has been completed the plants should be given a dressing of farmyard manure, stack bottom, compost, or similar material or a complete fertiliser.

Where space permits a good plan is to have several plants of each of three varieties. An early variety which can be forced by covering it early in spring with straw or a good-sized box can be followed, as soon as the early plants require resting, by a main-crop variety which should provide supplies until small fruits are generally available. Finally an ever-bearing variety can be grown to provide supplies in late autumn and winter.

Many varieties of rhubarb in home gardens are affected by virus disease, which may or may not have a serious effect on yield. It usually shows up as light and dark mottling of the leaves, which sometimes become streaked and highly coloured as they die down. Crowns infected by virus should be destroyed and care should be taken not to spread the disease to healthy plants by handling infected plants and then handling healthy ones. Washing of the hands will remove infection.

Shallots

The harvesting of shallots can be begun as soon as the bulbs are mature and the roots have started to rot. Proper drying off of the bulbs is important and if the weather is unfavourable, they should be laid under cover in trays in a dry shed.

Sweet Corn

Sweet corn bears separate male and female flowers, the tassel being the male inflorescence and the ear the female. Pollination normally takes place as soon as the silks appear and development of the cob should be rapid thereafter; the edible stage is usually reached two to four weeks later according to temperature, usually when the tassel has just withered. Maturity is commonly tested by thumbnail pressure. The young grains are first watery inside, then milky, then doughy, and finally the "dent" stage is reached, when the grains are too hard to be palatable.

Cobs should be harvested with a gentle jerk or cut with a sharp knife when the milky part of the grain is beginning to thicken but is still milky. In very exposed situations it is advisable to stake sweet corn, but in most situations earthing up of the stems will provide all the support necessary. Suckers often develop, but do not affect the earliness or number or weight of ears on the stem.

Winter Greens

Soil and Manure

Soil for winter greens should be deep, rich, and well drained and should contain plenty of organic matter. Most members of the cabbage family succeed in a great variety of soils if there is adequate plant food and moisture and drainage is satisfactory. They have very strong root systems, which recover well from injury during transplanting.

Heavier soils are preferable for main-crop winter greens, because they retain moisture better and are likely to be richer in plant foods, but light soils are often more suitable for early crops. Rotation of crops is important to cabbage crops, and heavy dressings of organic material such as compost, well rotted stack bottom, and farmyard, stable, or poultry manure are desirable on most soils.

Where organic manures are not available a green crop should be dug in, and, except where the soil is very rich, the green crops or organic manure should be supplemented with a fertiliser at 2 to 5 oz per square yard. A fertiliser having a 1:2 (or 3) :1 ratio of nitrogen, phosphate, and potash will generally give good results. Side dressings of nitrogenous manures such as nitrate of soda or sulphate of ammonia are often advisable, particularly where the organic matter applied to the soil is strawy rather than sappy or well rotted and when quick, forced growth is required, as in early spring.

Care should be taken not to apply too much nitrogenous manure in relation to phosphatic and potassic manure or the resulting soft growth will be easily damaged by frost, insects, and secondary rots. Potash is of particular value for hardening and giving texture to winter-grown brassicas. Where a complete fertiliser is not applied additional phosphate (best applied by a dressing of superphosphate) is advisable when farmyard or stable manure is applied, as such materials are low in phosphates.

Though drainage, temperature, moisture, and manure placement are very important, the ultimate weight of the winter greens crop is greatly influenced by the plant food available.

Lime

Annual dressings of lime at 2 to 4 oz per square yard are advisable on most soils, though more may be necessary in high-rainfall districts. Plants such as cabbages and cauliflowers are not especially sensitive to soil acidity, but they grow well in nearly neutral or slightly alkaline soil. Apart from giving the pH level (degree of acidity) of the soil that ensures good growth, liming by making the soil more alkaline tends to inhibit club root.

Though popular, the rotation of cabbage or cauliflower and potatoes should be avoided where club root and potato scab are troublesome, as liming inhibits club root but favours the development of potato scab; acid soils tend to inhibit scab, but favour club root.

Planting

Home gardeners often remove plants from the seedbed and set them out when they are very small. This is advisable only if the conditions are favourable. Plants should be sturdy, close jointed, hardy, and well developed and should be lifted with a fibrous tuft of soil and roots.

In the home garden, where there is usually no delay between lifting and setting out the plants, it should not be necessary to puddle the roots in thick muddy water to keep them moist, as is often done under commercial conditions. When the plants are lifted the top growth can be dipped in a solution of lindane or nicotine sulphate and DDT if aphids and caterpillars are troublesome.

Planting should be done with a trowel, as the plants may not develop properly if the taproot is bent up, as often happens when they are planted with a dibble. If dry, plants in the seedbed should be watered thoroughly the night before they are lifted.

Blind plants (those with no growing points) or very weak plants should be discarded. Usually plants with bent or coarse, thick taproots develop better if about 1 in. is cut from the root end. Rows should be 24 to 30 in. apart and plants 18 to 24 in. apart in the rows, according to the size of the variety.

Varieties

Choice of varieties of winter cauliflower or broccoli, savoy cabbage, and kale is important. Varieties of winter cauliflower or broccoli can be bought which will mature at different periods so that, if suitable varieties are chosen, a succession of heads for cutting can be had from early autumn until late spring; the latest savoy cabbage is usually mature by August.

Kales and sprouting broccolis are most useful during late winter or early spring, when other green crops are often in short supply, but discrimination is needed in choosing the better sorts of kale. Some varieties of leaf kale have tough leaves with a strong, sometimes rather harsh flavour. The finer-leafed sorts should be grown in the home garden. Asparagus kale and sprouting broccoli are well worth a trial where seed is available, as they are nutritious and some varieties have a delicate flavour if well grown and compare favourably in texture and flavour with the finest of green vegetables.

Example of varieties of broccoli which mature successionally are: American No. 1, which produces heads in June and July, American No. 2, heading in August and September, and American No. 3, heading during September and October.

Other examples are Winter Mammoth, maturing in mid winter, Superb Winter White, maturing in June, July, and sometimes in August, Lily White, maturing in July and August, St Valentine, maturing in August and September, and Late White, maturing in spring. The maturity dates are approximate and may vary with strain, district, and season.

Non-heading varieties of broccoli include Italian Green Sprouting (Calabrese), Early Purple Sprouting, Late Purple Sprouting, and White Sprouting. Varieties of kale or borecole include fine-leafed sorts which may mature early or late and asparagus kale.

Varieties of Brussels sprouts include: Early, Cambridge No. 1 and Harrison's XXX, both of medium habit with large sprouts; main crop, Evesham's Special, a tall variety with medium sprouts, Evesham's Selected, a medium variety with large sprouts, and Covent Garden and Ormskirk Giant, tall varieties with large sprouts; late, Cambridge No. 5 and Scrymger's Giant, both large varieties with large sprouts.

Varieties of savoy cabbage are available to mature from early autumn to about the end of August.

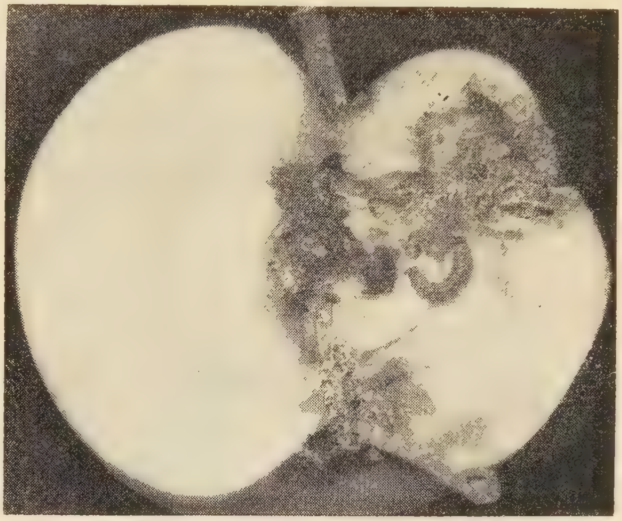
A good early variety is Best of All, which can be followed by Drumhead Savoy, Omega, Rearguard, and Ormskirk Late in that order.

The Home Orchard in Summer

By D. W. McCALLUM,
Horticultural Instructor, Department of Agriculture,
Blenheim

The adult codling moth has a wing span of nearly ¾ in. and is bluish grey and most inconspicuous against the grey bark of the trees where it rests during the day.

▼ The larva of the codling moth may cause serious losses where control measures are not taken.



RARELY will a single application of any spray control a pest or disease of fruit trees. No single spray application or even a complete spray programme can be effective unless it is applied when the pest or disease is in a condition to be affected by the material used. A knowledge of the life cycle of the pest or disease is therefore necessary if sprays are to be correctly timed. A major pest of pip fruits is the codling moth (*Cydia pomonella*), the life cycle of which is described in this article giving suitable control measures. Routine summer work is also discussed.

CONTROL OF CODLING MOTH

THE codling moth, regarded as a native of south-east Europe, has spread wherever apples and pears are grown throughout the world. The larvae bore into apples and pears, eating their way through to the core and making the fruit commercially valueless. When control measures are not adequate it is undoubtedly the most injurious pest of these two important fruits. Stone fruit and walnuts may also be attacked, but rarely severely enough to justify control measures.

The adult moth has a wing span of nearly ¾ in. and is bluish grey and most inconspicuous against the grey bark of trees where it rests during the day. The forewings are a pale grey, but the uniformity is broken by irregular, dark, wavy transverse lines and a coppery spot near the tip. The hind wings are greyish brown throughout but slightly darker near the margins. The moth is active only at night.

The eggs are about the size of a small pinhead, pearly white when laid but darkening as the embryo develops.

The newly hatched caterpillar is white with a relatively dark head. When fully grown it may be up to an inch long and is yellow or pink in the body with a pale brown head.

The insect overwinters as a fully grown caterpillar protected by a white webbing. It can frequently be found in cracks in the bark of fruit trees, but it will hibernate anywhere it is likely to find shelter.

In spring these caterpillars pupate and remain in this state for from three to eight weeks, depending on the locality and climate.

After mating, the female moth lays eggs on young fruits, leaves, and twigs. After about ten days the young caterpillars hatch out and find their way to the fruit to begin feeding.

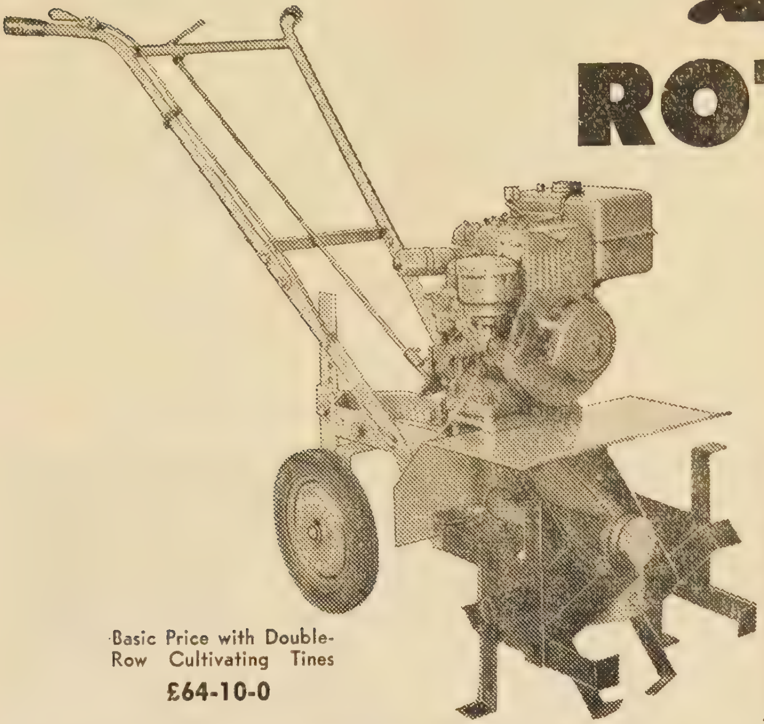
After three or four weeks the caterpillars are fully grown and they emerge from the fruit to seek a suitable place to pupate.

Affected fruit frequently falls to the ground before it is ripe, but even if it remains on the tree until it is mature the fruit is unattractive and subject to rots.

Fruit may be attacked over a long period which varies according to the climate. Investigations over the past few years in Nelson have shown differences of several days between peak moth flights in areas only a few miles apart. In the South Island and in the southern half of the North Island there is usually only one generation in a season. From Hawke's Bay north there is frequently a small second generation.

Spraying to control codling moth should begin about mid November and carry on until late January.

Two materials are in common use, arsenate of lead (1½ oz to 4 gallons of water) and DDT. The dilution of DDT varies according to the strength of the formulation used and manufacturers' recommendations should be followed. Both materials have their advantages and disadvantages. Arsenate of lead is effective against leaf-roller caterpillar and DDT is not. Further, DDT is toxic to several beneficial insects which prey on woolly aphis and red mite, and a build up of these pests is likely if DDT is used continuously.



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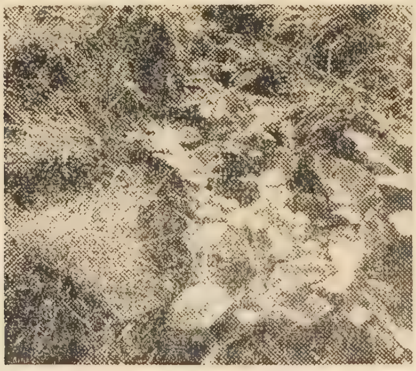

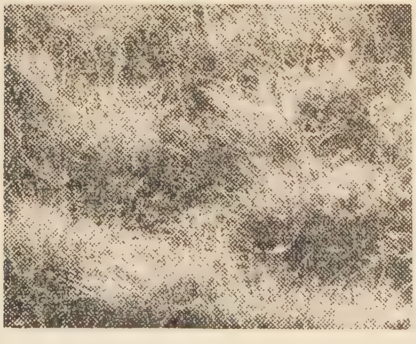

DOCKS QUICKLY CLEARED FROM PASTURES & CROPS WITH SHELL HORMONE WEEDKILLERS

Docks were completely cleared from this pasture (see photos at left) at a cost of only £2 per acre, by spraying with Shell Weedkiller "L". Lucerne and clover crops being grown at the time were not affected

One of the outstanding advantages of the new range of advanced hormone weedkillers introduced by Shell is the number of formerly "hard-to-kill" weeds, such as docks, which have now been brought under control. Docks in pastures should be sprayed with 4½ pts. of Shell Weedkiller "L", with a minimum of 12 gals. water per acre. This will kill broad leafed and curled docks in the seedling stage. Older docks will be checked but will require repeat applications before being completely eliminated. Shell Weedkiller "L" also kills or controls a wide range of annual and perennial weeds, including fathen, nettle, thistles, and plantains. Clovers and lucerne are resistant.

DOCKS IN CEREALS—Docks in cereals can be controlled, without setting back the crops, by spraying with Shell Weedkiller "M" according to directions and at the times stipulated on the label of the tin.

DOCKS IN PEAS, YOUNG PASTURES AND UNDERSOWN CEREALS—Shell Weedkiller "P", another highly selective weedicide, is recommended for the control of docks and many other weeds in peas, young pastures and delicate cereals.

Full details and further information regarding recommended hormone weedkillers may be obtained from your usual supplier or from the Shell Agricultural Division, P.O. Box 2091, Wellington.

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Arsenate of lead has a harsher effect on the foliage of fruit trees, especially when combined with lime sulphur, and russeting of the fruit may occur. However, this is probably not very important in the home garden. Arsenate of lead should not be used on stone fruit trees, as it is likely to cause damage.

SEASONAL WORK

Thinning of Fruit

One of the most neglected tasks in the home orchard is the thinning of fruit, yet few practices do more to ensure regular crops of good quality.

Apples

Naturally large varieties of apples such as Ballarat need little or no thinning in most seasons. Long-stemmed varieties such as Golden Delicious and Rome Beauty which normally bear consistent crops may quite well be left unthinned. Most other varieties require thinning. Recommendations for more common varieties are:

Sturmer—Reduce fruit clusters to three fruits

Jonathan—Reduce fruit clusters to one or two fruits

Gravenstein—Reduce fruit clusters to two fruits

Cox's Orange—Reduce fruit clusters to three fruits.

Delicious—Reduce fruit clusters to three or four fruits

Thinning of apples is best delayed until mid December, when the natural drop will have taken place and the orchardist has a better idea of his potential crop.

Pears

Pears require thinning only when there is an exceptionally heavy crop, but an exception is Winter Cole, which is reluctant to swell its fruit unless thinned.

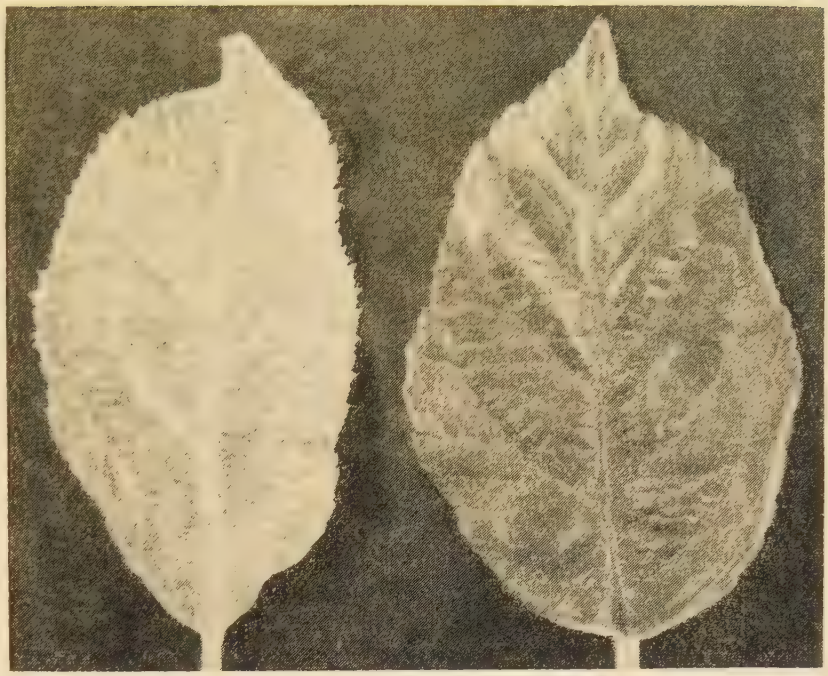
Stone Fruit

Thinning is important with all stone fruit. Clusters should be broken up and fruits remaining should not touch even when fully grown.

Passionfruit

Where passionfruit grows and produces well considerable quantities of plant foods are taken from the soil. If vigour is to be maintained, these must be replaced. A mixture of 2 lb of blood and bone, ½ lb of sulphate of ammonia, ¼ lb of sulphate of potash, and ¼ lb of superphosphate should be applied to each vine in December and again the following August. Younger vines which have not yet begun cropping need only about 1 lb of blood and bone before cropping begins.

A regular supply of moisture also is necessary for good growth and vines should be irrigated before the land dries out too severely. Extreme dryness causes premature defoliation and the dropping of fruit.



Powdery mildew attacks leaves, shoots, and fruits, but symptoms are most apparent on the leaves, which are more or less covered with a grey or white film, as is the leaf at left in the illustration. The other leaf is healthy.

Currants

As with most other small fruit currants must be fully ripened before harvest if the best flavour is to be developed. Currants are frequently irregular in maturing, but modern varieties hold their fruit well and normally it is best to delay harvesting until most or all of the fruit on a truss is ripe.

Pest and Disease Control

Powdery Mildew

Powdery mildew, a fungous disease, can be severe on apples, particularly on the more susceptible varieties such as Jonathan, Cox's Orange Pippin, Sturmer, and Rome Beauty. It attacks leaves, shoots, and fruits, but symptoms are most apparent on the leaves. The terminal leaves on young shoots are usually the first affected. They remain small, are more or less covered with a grey or white film of the fungus, and will probably fall early, leaving an unthrifty shoot with distorted buds.

Colloidal sulphur (1½ oz of 40 per cent material) plus lime sulphur (4 fl. oz.) to 4 gallons of water will check the spread of this disease. These two materials may be combined with the insecticide used for codling moth control.

Raspberry Rust

Until a few years ago raspberry rust was confined to the North Island, but it now appears regularly in Marlborough and Nelson, though not severely enough to cause much damage. Spray after the berries are harvested with lime sulphur (4 fl. oz.) and colloidal sulphur (1½ fl. oz.) in 4 gallons of water. The infection overwinters on fallen leaves and a further spray in autumn at leaf fall will reduce infection further.

Red Mite

Red mite frequently becomes severe during summer. Apples are mainly affected, but other tree fruits and berry fruits may be attacked, especially in areas of low humidity. Affected leaves are lighter in colour and in severe attacks will become brown and brittle. Fruit on affected trees will remain pale and dull.

The spray recommended for powdery mildew control will help to keep mites at bay on apples, for they are intolerant of lime sulphur. Otherwise two summer oil (2 fl. oz. to 1 gallon of water) sprays about ten days apart will give satisfactory control. This material should not be used within a fortnight of using lime sulphur; otherwise plant damage will occur. Thorough coverage is essential to give control of the mite.

(Continued on page 480)

Sod Seeding Cereals into Pasture for Winter Green Feed

LAST autumn several trials were laid down in Canterbury to investigate the suitability of sod-seeded cereals for providing increased winter green feed on dairy farms engaged in whole milk production. The interim results of these investigations up to the first grazing, which was carried out 10 weeks after seeding, have been sufficiently promising to justify a review of the relative merits of this new practice.

ONE trial was carried out on a pasture which was dominantly cocksfoot but which also contained perennial ryegrass and white and red clover. It had been severely affected by the drought. The heavy clay soil was hard and dry. Rain soon after seeding resulted in a good strike of the cereals and a good recovery of the pasture.

Another trial was sown in a two-year-old clover-dominant pasture. As the result of spray irrigating the pasture before seeding the drilling in of the seed was assisted and a good strike was gained. Some varieties were through the ground within 10 days.

The cereal varieties included were C.R.D. ryecorn, Wong barley, Cape barley, Arawa wheat, Russet oats, Algerian oats, and Winter Grey oats with Italian ryegrass for comparison. All are being studied for productiveness, recovery ability, freedom from disease, and palatability.

All treatments were drilled with a sod seeder, fertiliser and seed being sown together through the manure run.

The cereals were sown at the two rates of 2 bushels and 1 bushel per acre and the Italian ryegrass at 1 bushel and ½ bushel per acre.

Two rates of fertiliser were also applied. The high rate was 3 cwt per acre of an ammonium-nitrate lime mixture and 1 cwt of superphosphate; the low rate was half of this.

Further investigative work dealing especially with fertiliser usage remains to be done, but from results so far a minimum quantity of 1 cwt of each of a phosphatic and nitrogenous fertiliser per acre is required to ensure rapid establishment of the crop.

Experience with varying seeding rates suggests that a seeding of from 2½ to 3 bushels per acre will give satisfactory results. Observations indicate that high seeding rates tend to suppress the contribution by the grasses and clovers. The suppression of clovers may be desirable in some instances.

Of the cereals tested to date all except Algerian oats have thrown a good bulk of feed within 10 weeks of sowing, the erect types like Abundance, Russet, and Winter Grey oats and Arawa wheat doing particularly well in this respect. C.R.D. ryecorn and Wong and Cape barley are more prostrate in growth habit and require more careful grazing management. The first two can be relied on to give excellent recovery growth throughout the late winter-early spring period provided grazings are carried out when growth approximates 4 in. in height.

—D. J. G. DAVIES,
Fields Instructor,
Department of Agriculture,
Christchurch

Home Orchard in Summer

(Continued from page 479)

Aphids on Currants

Currants are sometimes affected by aphids. The foliage, especially near the tips of branches, curls up and if the attack persists becomes pale. Growth is checked and the following season's crop will suffer accordingly. Summer oil (2 fl. oz.) plus nicotine sulphate (1 teaspoon) to 1 gallon of water will control the aphids. The spray will require to be repeated about ten days later. Malathion or lindane sprays would also be effective.

Grass Grub

Grass grub may be controlled by applying 1½ lb of 50 per cent DDT to 1,000 sq. yd.

Need for Water

All types of fruit are sensitive to a lack of moisture, especially in the weeks preceding maturity, when the fruit is swelling rapidly, and water should always be given before the ground becomes too dry and the plants begin to wilt. If the vegetable garden needs watering, the home orchard will need it too.

All photographs by Shell.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during July 1959 and for the 12 months ended 31 July 1959 with comparative figures for the same month and the 12 months of 1957-58 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
July 1959	2,807	4	2,811	—
July 1958	3,027	1	3,028	—
Increase or decrease	—220	+3	—217	—7.166
12 months ended 31/7/59	178,399	2,718	181,117	—
12 months ended 31/7/58	174,287	2,867	177,154	—
Increase or decrease	+4,112	—149	+3,963	+2.237

Butter in store at 31 July 1959 was 4,816 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
July 1959	51	—	51	—
July 1958	102	—	102	—
Increase or decrease	—51	—	—51	—50.00
12 months ended 31/7/59	66,474	13,429	79,903	—
12 months ended 31/7/58	77,799	13,251	91,050	—
Increase or decrease	—11,325	+178	—11,147	—12.242

Cheese in store at 31 July 1959 was 6,486 tons

If these figures are converted into butterfat equivalent, there is an increase of 0.485 per cent in butterfat graded for the 12 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

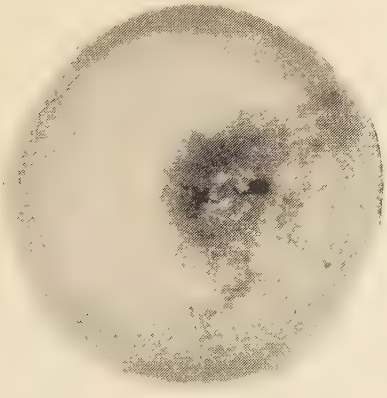
Mealy Bug Resurgence in Hawke's Bay Orchards

DURING the last two or three years there has been a pronounced resurgence of mealy bug in Hawke's Bay orchards. It has become the most serious pest for many growers of pip and stone fruit. Investigations have been carried out on mealy bug biology and control by officers of the Horticulture Division of the Department of Agriculture for the last two seasons. Results of these investigations are given in this article by N. B. Congdon, Horticultural Advisory Officer, Hastings, and L. G. Morrison, Horticultural Advisory Officer (Biology), Wellington, both of the Department of Agriculture.

MEALY bug was formerly a problem in pears in certain areas of the district, but with the introduction of DDT it has until recently been kept under control. The introduction of parasitic insects in the early 1920s may also have contributed toward satisfactory control. However, growers in these areas have always noticed a small population of mealy bugs, but not, until recent years, sufficient to cause concern.

The resurgence of the pest has been put down to various reasons. The main explanation appears to be that mealy bugs have become resistant to DDT, which, in turn has probably killed out any parasites which may have become established. There may be other factors involved.

A rapid build-up of the pest is occurring not only in pears, but in apples, peaches, plums, and grapes. From a survey carried out last season it appears that at least 90 per cent of the orchards in the district are affected to varying degrees, Havelock North being by far the worst.



[*R. W. Orr*

Granny Smith apple with black sooty mould deposits resulting from the presence of mealy bugs.

Classification

Mealy bugs belong to an order of insects known as *Homoptera* to which belong such sucking insects as aphids, cicadas, leafhoppers, and spittlebugs, and the family coccidae, which include the scale insects.

Mealy bugs do not have a shell or hard outer skin but are covered with a fine white powdery or cottony wax which enables them to withstand severe treatment without bodily injury. Another function of this wax is believed to be the protection of the insect against moisture, for example, excessive water loss or against drowning. Of the *Pseudococcus* genus of mealy bugs in New Zealand, three species *P. maritimus*, *P. comstocki*, and *P. gahani* are reported as attacking pears, while these and *P. adonidum* attack apples. Of these, the grape mealy bug *P. maritimus* appears to be by far the most prevalent and the following notes apply to it.

Distribution and Hosts

The bugs are present throughout New Zealand, mostly in small numbers. However, during the last two seasons there has been a phenomenal build-up of mealy bugs in the fruit-producing areas of Hawke's Bay. In this district the hosts of primary importance are pears, then apples, grapes, peaches, and plums. Of secondary importance are grass, clover, and docks and other weeds. However, some 400 hosts have been recorded elsewhere.

The areas they most commonly infest on fruits are the calyces of pears, the stem ends of apples, and both these areas where fruit lie together.

[*D.S.I.R.*

Adult female mealy bugs on lemon.

Damage

The main damage caused by the bugs is indirect:

(a) The feeding of the insects on tender parts of plants may cause them to curl up and become distorted or stunted. This is particularly true on grape vines. If severe, infestation causes premature defoliation. Vines, for example, will not be able to ripen their wood properly and the result is poor growth and light crops the following year.

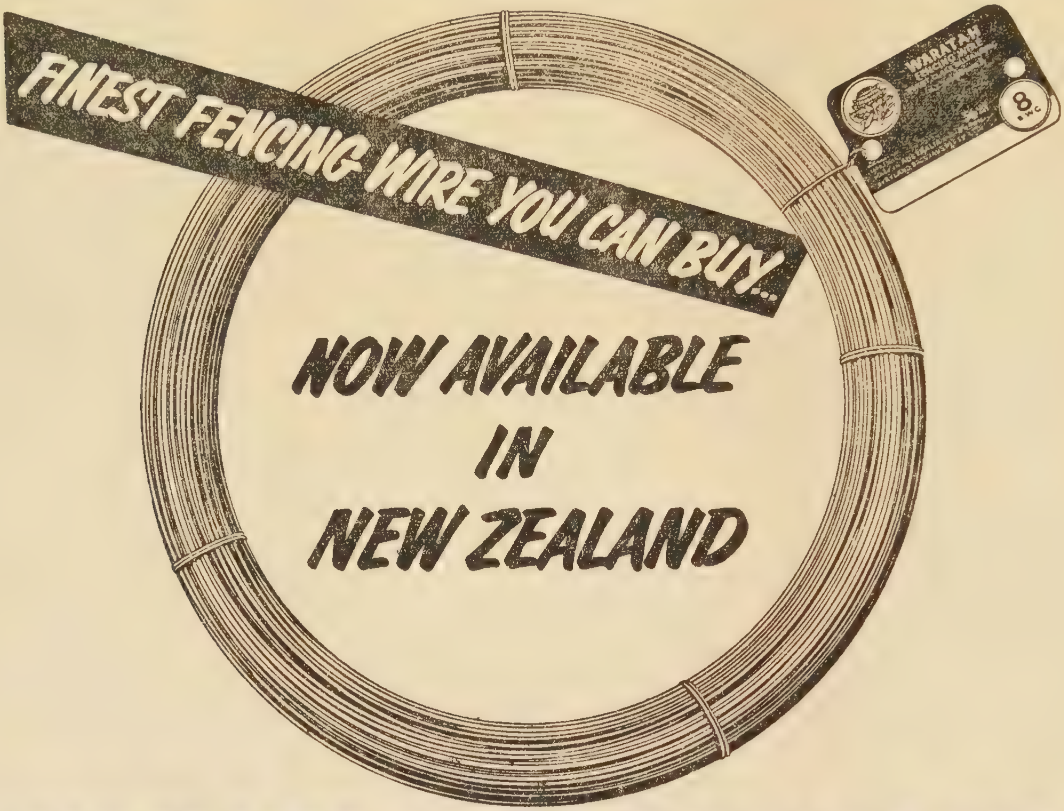
(b) Honey dew is freely excreted by the insects. Often the honey dew becomes infected by a sooty mould fungus. Manuka blight shows a severe form of this. Where the sooty mould appears on the fruits it makes them unsightly, even unsaleable. On the leaves it interferes with respiration and carbohydrate formation. This is undesirable, as it affects flower bud development.

(c) Disease transmission: Every injury caused by feeding bugs is a possible point of infection by fungous diseases.

Description

The male bug is only ⅛ in. long and because of its small size is rarely seen. Males have two well developed wings and at the tail end have two long white filaments. They have a very short life.

Young of both sexes look alike and the mature female differs only in size and in the amount of waxy covering secreted over the body. Mature females are regularly oval, flattened, and usually completely covered with a fine white powdery wax which extends along the side as lateral filaments, with often two or more longer ones at the end (called tails). They grow to be about ¼ in. long and ⅛ in. wide. All have six legs and are able to move about freely during their entire existence.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The mouth parts consist of a long thin sucking tube which can penetrate into the plant tissues and withdraw sap. This is important, as mealy bugs cannot be poisoned unless the poison is in the sap stream.

Beneath their waxy covering the bugs vary in colour from flesh pink to grey.

Life History

In Hawke's Bay mealy bugs emerge from their winter dormancy toward the end of October and start feeding. When the female is about to lay eggs she moves to some part of the tree where she will be well protected. Early in the season this is likely to be under the bark or in crevices of branches. Later in the season females will also choose to hide beneath the calyx of fruit, particularly on pears.

The female deposits her eggs in a loose cottony sac of waxy threads. As this egg laying occupies several days and the eggs do not all hatch at once, it is difficult to determine for how long they are incubated. However, under New Zealand summer conditions the period appears to vary between two and three weeks. As each female may deposit up to 500 eggs, mealy bugs can increase rapidly under favourable conditions.

Shortly after hatching, the young bugs or "crawlers" make their way to young shoots, leaves, or fruit, where they settle down and begin to feed on soft tissue. At this stage, when their food reserves are low and their covering of protective wax is very light, they are most vulnerable to attack.

In the next four weeks the crawlers moult twice. Before moulting for the second time the male spins a cocoon, from which it emerges as a small winged insect. These males have no functional mouth parts and therefore can live for a few days only. During this time they mate with the females, though these are only about one-third grown.

Under favourable conditions *P. maritimus* can complete its life cycle in about 60 days. Later in the season, when the weather is cooler, more time is required, sometimes up to five months. As the time required for development is shorter during summer, the numbers of mealy bugs increase rapidly then and they are usually most abundant in late summer and autumn.

Overwintering

Overseas the bug is reported as frequently overwintering as eggs which have been deposited in a secluded spot, such as under rough bark, cracks, crevices, or at contact points between branches. Incubation of these eggs takes months. On hatching, the crawlers may continue under the protection of the ovisacs (egg cases) for some days.

Alternatively, partially mature but fertile females may move off the aerial parts of deciduous trees and overwinter under the protection of stakes, ties, labels, and litter. This is so in New Zealand, but also in Hawke's Bay all stages from eggs to adults have been found in mid winter on trees and round birds' nests. Vast numbers could also be found right in the centre of the tree if the old "sprags", which are common on some pear trees, were broken apart.

Where water sprouts are cut back rather than cut off, it takes only a few seasons for these stumps to form a network of crevices providing very good protection for the bugs. No sprays can reach them and as long as this cover is not pruned off a constant source of reinfection remains throughout the year.

Overwintering egg masses under loose bark of pear wood, which affords ideal protection. Young crawlers emerge from these sites at the end of October and in early November.

Spread

Mealy bugs may be spread by various methods. One of the most important is the transfer of infested plants, fruits, and containers and on the clothing of workers who brush against infested material. Animals may also spread the bugs through contact. Overseas, birds are considered to be important vectors, as they may pick up the young crawlers on their legs and feet when settling on infested trees.

Insects, especially winged species, may spread the pests in the same way, bees particularly, as they are attracted to the honey dew the bugs secrete.

In South Africa wind is thought to be an important factor. Immature stages can be blown about, and a gale will break off and scatter infested leaves and twigs. Floods and irrigation water are other means of spread. Females and ovisacs can float on water for days without damage, as the wax on the eggs and adults protects them. Furthermore, the delicate wax threads round the egg sacs will stick to any object touching them. When the object moves, threads and some eggs go with it.

Enemies

Natural enemies may be placed in two groups according to their method of attacking the host:

Internal parasites, those feeding and developing within the body of the host: One, a chalcid wasp, was introduced into New Zealand in 1923-24, but has had little effect.

Predacious enemies, those completely devouring the host: The chief of these is the ladybird beetle *Cryptolaemus montrouzieri*, or mealy bug destroyer. This black and orange-ended beetle, only 1/16 in. long, is a native of Australia. It lays its eggs among the mealy bug eggs. The young of both hatch about the same time; then the ladybird larvae proceed to eat the young bugs. These ladybirds were first liberated in New Zealand in 1897. Four years later mealy bugs were reported to be under control, but subsequently more beetles had to be imported and were liberated in 1924. The beetles are now scarce, probably because our climate is unsuitable for them. In California these ladybirds are raised under artificial conditions during winter, but that is not practicable here.

Minor predators include other beetles, lacewings, and some flies.

Control

Control measures fall into three categories, biological, cultural, and chemical.

Biological

This has been briefly discussed above.

Cultural

(a) **Clean cultivation**, especially round the bases of trees: Not only does litter at the base of a tree provide

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protective cover for bugs, but grass, clover, and weeds may be alternate hosts and a source of reinfection.

(b) **Scraping trunks** of pear trees so that all excess bark is removed from older trees is particularly useful in removing overwintering sites and also allows more effective spray coverage. This suggestion may be rejected on grounds of cost of the operation and possible damage, but it would undoubtedly assist control.

(c) **Clean pruning:** By this is meant the removal of all old, spent, or dead fruiting spurs, and twigs and water sprouts from inside the pear leaders. These parts provide ample shelter for mealy bugs and if present are nearly always infested.

*Chemical

Recent experiments carried out in Hawke's Bay orchards show that with the large range of insecticides available only the organo-phosphate materials are effective. In particular two materials, parathion and diazinon, have given good control. However, fairly high rates of application at frequent intervals and with good coverage are essential.

Of the two, parathion appears a little more effective than diazinon, but is extremely dangerous to operators, who must wear the recommended protective clothing. Diazinon is safer to the operator, but is more expensive (almost double the price of parathion when used at a strength to give equal control).

Trial on Pears

A brief description of last season's trial on 1 acre of Winter Cole pears at Havelock North is given below.

Treatments were as follows:

	Per 100 gallons
Parathion (31 per cent) ..	10 oz
Parathion (31 per cent) ..	15 oz
Diazinon (20 per cent emulsion)	½ pint
Diazinon (20 per cent emulsion)	1 pint
"Phosdrin" (25 per cent emulsion)	½ pint
"Phosdrin" (25 per cent emulsion)	1 pint

Preceding these treatments was an overall combined application during the dormant season of winter oil 1 in 20 + lime sulphur 1 in 15. There was a heavy carry-over of mealy bugs (eggs and adults) from the previous season and infestation was considered to be uniform throughout the pear block.

Treatments were in single rows of eight trees each separated by guard rows. Spraying was done with the grower's air blast machine, about 6 gallons per tree being applied, and was carried out in a system to eliminate drift to adjacent trees as far as possible. The trial block received four applications.

The first was applied on 12 November when a heavy infestation of all stages from crawlers to adults was collecting, mainly round the bases of young lateral growth, particularly in centres and tops of trees. To obtain the greatest possible kill, spraying was delayed a few days from when first emergence was noted. Bugs appear to feed at the base of young growth for a week or two before moving out to leaves and fruit spurs.

Before the second application all trees were summer pruned (all surplus lateral growth was pulled out (not cut) from the centres of the trees, and as far as one could reach along the fruiting arms). This was done to allow better penetration of sprays and to reduce protection for the bugs. Many bugs adhering to the bases of the laterals were removed on the growth pulled out.

The second application with all treatments was made on 6 December. Spraying was done at a time when it was considered there was a predominance of young crawlers round laterals and spurs from a recent second hatching.

It was obvious from this stage onward that there was an overlapping in stages between eggs and adult bugs. This was probably due to the fact that bugs emerge from wintering places both as young crawlers and as adults. As a result of the first two applications very few had managed to reach the calyx in the most effective treatments.

On 17 January a third application was made as for the earlier treatments except that "Phosdrin" ½ pint, which was giving poor control, was replaced by parathion.

On 17 February the fourth and final sprays were applied, being similar to those of the third application. Before this final spray it was evident that re-infestation from a late hatching had occurred during early February from eggs laid within the actual spur, crawlers having only a short distance to travel to infest fruit. They quickly collected at the point of contact between pears in the bunch and some moved into the calyx to become firmly embedded under the calyx leaves.

Harvesting of the trial block was carried out between 11 and 14 March, fruit being picked into bulk trailers. Samples of five cases of pears from each treatment were examined for presence of bugs in the calyx. Percentages of infested fruit from each treatment at harvest were as follows:

	Per cent
Diazinon: ½ pint	61.9
1 pint	19.9
Parathion: 10 oz	26.2
15 oz	14.5
"Phosdrin": ½ pint (2 sprays) followed by parathion 15 oz (2 sprays)	76.2
1 pint	75.5

Control Recommendations

1 From first or second week in November and at three-weekly intervals until 14 days before harvesting apply:

	Per 100 gallons
Parathion (31 per cent)	15 oz
or	
Parathion (25 per cent)	18½ oz
or	
Diazinon (20 per cent)	1 pint

Ensure best possible coverage to reach bugs in sheltered places on the tree and include a wetting agent in the spray. An autumn application as soon as possible after harvest will reduce carry-over to the next season. (The above strengths could be reduced with closer-interval spraying.)

2 Remove all surplus lateral growth from the insides of leaders and fruiting arms during early summer. At this period before growth has hardened laterals can be pulled out by hand and this is preferable to cutting, which leaves stubs that provide additional shelter for bugs.

3 To reduce migration of crawlers from weeds and grasses under trees maintain a clean zone round butts during spring and summer.

4 On old pear trees the removal of "sprags" (old gnarled and knobbly growths on leaders and fruiting arms) and scraping off of loose bark from trunks and leaders will greatly reduce the main sheltering places for mealy bugs and assist control.

Growers are strongly recommended to take appropriate action where mealy bug is either well established or beginning to appear. There is no point in applying contact insecticides where bugs are not to be seen, but once they appear in a block, infestation is rapid if control is neglected. Eradication is then a far more difficult and costly business.

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* Permissible residues on food at time of sale of some of the materials mentioned are specified in Amendment No. 12 to the Food and Drug Regulations 1946 as follows: Parathion, not greater than 1 part per million; "Phosdrin", nil. The Systemic Pesticides Notice 1959 prohibits application of "Phosdrin" to pip and stone fruits within one week of harvesting and of "Rogor 40" within two weeks of harvesting.

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Fruit with even one crawler was classed as infested, and it should be noted that figures for diazinon 1 pint and parathion 15 oz treatments were mainly very slightly infested fruit (three crawlers or fewer per pear).

When this trial was laid down it was intended to keep applications as far as possible to a minimum in view of likely grower practice and cost of materials. Until the end of January satisfactory control had been obtained with parathion and diazinon at the interval used. With the heavy crawler emergence in early February and the difficulty in getting spray to penetrate it appears that at least two closely spaced sprays would have checked this late infestation better than the one application in mid February.

Percentages of infested fruit at harvest appear high from the figures. However, with parathion 15 oz and to a less extent diazinon 1 pint reasonable control was obtained with only four sprays when it is considered that unsprayed trees (which of course could not be included in a grower trial) would undoubtedly have had 100 per cent of infested fruit.

Trial results suggest that growers in bad mealy bug areas should apply sprays at regular intervals (say every three weeks) rather than attempt to time applications to crawler emergence. For Winter Cole pears this would mean about six applications, the first in early November and the last 14 days before picking. A further application might be required on Winter Nelis. Earlier varieties of pears would require proportionately fewer applications unless it was seen that infestations continued to build up after harvesting.

Removing "sprags" from leaders of pear trees with a small circular saw (inset) operated from a compressor mounted on the back of a tractor. Removal of these old knobbly growths and scraping of loose bark from trunks eliminate the main sheltering places for mealy bugs on old pear trees.

Other Trial Work

***New chemicals:** New spray materials, mainly organo-phosphates, are continually becoming available for trial, and these are being included in experiments where considered worth while. One of these, "Rogor 40", from a preliminary trial at the end of last season appears particularly promising as an alternative to diazinon and parathion. It will be included in larger trials this season.

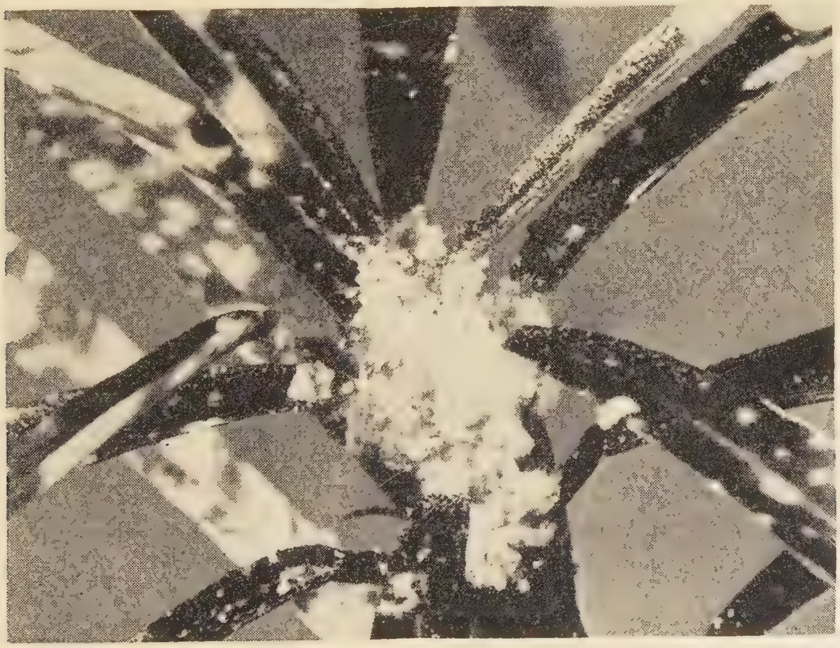
Tree banding: Small-scale trials are being carried out to investigate the possibility of trapping mealy bugs migrating from the ground on to the trees by placing a sticky band round the trunks. There is little evidence to date to suggest anything of practical value. The difficulty is to find a material which will retain its sticky surface for long. One or two promising compounds will be investigated this year.

Trial work this season will be based on an investigation of the effectiveness of promising and recommended sprays in relation to timing, interval between applications, and dose rates. It is also proposed to compare dilute and semi-concentrate methods of application.

Growers are themselves doing a certain amount of trial work on their own properties that is providing useful information.

Acknowledgment

The cooperation of Mr J. W. Jones, Napier Road, Havelock North, on whose property trial work was carried out in the 1958-59 season is acknowledged.



[Shell

Close up of mealy bug on *Codiaeum*. Beside fruit trees the pest attacks a wide range of ornamental trees and shrubs.

* See footnote on page 485.

The rose, the queen of summer flowers, supplies blooms which are among the best of cut flowers.

Summer Care of Roses in the Flower Garden

FEW flowers repay the gardener more for regular attention throughout the year than do roses. This article by J. P. Salinger, Horticultural Advisory Officer (Ornamentals), Department of Agriculture, Wellington, describes their routine care during the growing season.

APART from climbing roses of the rambler and wichuriana types such as Dorothy Perkins or Paul's Scarlet Climber which normally flower once, all other roses will flower from late spring until late autumn or winter.

Many gardeners obtain an abundance of blooms from their roses in the early part of the season, but after this first flush, growth and flowering are frequently disappointing. As each cluster of flowers is produced only on fresh new growth, the plants must continue to make new shoots and leaves during the whole of the summer to produce more flowers.

To encourage this growth regular culture is necessary, the exact treatment to be given depending on the age and type of rose. These operations are described under two headings, the treatment for specific types of roses and the routine treatment for all roses.

Treatment of Specific Types of Roses

Newly Planted Roses

Roses planted the previous autumn and winter will be making new shoot growth; they will therefore require attention for the first year to see that a good root system is formed.

Newly planted bush roses produce flowers in early summer at the same time as established plants, but it is unwise to let the plants flower at this time, as they will expend their energy in flowering instead of producing shoots and leaves. The best policy is to pinch off the first flower buds as soon as they are seen; the plants will then make better growth and may be allowed to flower a little later, about December. They should be watered well, if the weather is dry in spring or early summer.

If there has been heavy rain, the soil may have been washed away from the base of the plants. The soil should then be replaced or soil added if the bed has sunk, exposing the stem below the bud union. The young shoots of climbing roses should be regularly tied in gently to the supports.

Established Plants

Established plants should be growing strongly and will require regular examination. In windy areas it is advisable to stake these plants not only to prevent the whole plant rocking in the wind but also to prevent young shoots being blown off or damaged by rubbing against the thorns. One short strong bamboo cane or green-painted metal stake inserted near the centre of the bush will be sufficient. The base of the plant can be tied to this near ground level and the young shoots lightly looped to the stake at varying heights. The stake will not be seen, but will provide sufficient support and ties of soft brown string are inconspicuous. Ties on standard roses should also be examined.

Climbing and Rambler Roses

Climbing and rambler roses flower initially on short young shoots produced on older wood. At the same time strong young canes grow from the base of the plant or from the main branches. These young canes should be gently placed and tied in an upright position to one side of the plant. If left too long without tying, they may break off or grow unsuitably.

As rambler and wichuriana roses have only one crop of flowers each year, they can be pruned immediately after flowering. Where there are sufficient replacement shoots on rambler roses all the older wood may be removed. Wichuriana roses do not usually produce enough young shoots, so a proportion of the healthier older shoots should be retained.

Weeping standard roses are usually rambler varieties and so should be pruned like ramblers after flowering.

Routine Work with All Roses

Watering and Mulching

In an established rose bed the topsoil is normally full of roots, and to ensure adequate growth throughout the season it is necessary to apply water in all the drier areas during summer.

Watering should commence as soon as the top 2 in. of soil becomes dry and a large amount should be applied at every watering. Care should be taken not to flood the beds, but to apply the water in fine droplets. This can be done by watering through a hose with a fine nozzle or with a perforated plastic hose, ensuring that a minimum of water falls on the foliage, as damp foliage is conducive to the spread of black spot disease. Frequent light applications of water are of no benefit to the plants, as the water will not penetrate to the deeper layers of the soil and the plants will tend to produce roots close to the surface and so be more susceptible to drought.

Watering can be reduced by mulching the beds with organic matter and this is essential if there are local water restrictions or the ground is sloping.

Suitable mulching materials are well rotted deep litter poultry manure or other decomposed animal manures, rotted compost, spent hops, or a mixture of sawdust and grass mowings.

Freshly decomposing animal manure or green plant refuse are not satisfactory, as they can damage the plants when decomposing; fresh sawdust, even when mixed with nitrogenous fertiliser, is not satisfactory, as it dries out in hot weather and is very difficult to wet again.

All mulching material should be well broken up before use, so that it can be easily spread on the bed with a shovel or fork without damaging the plants. The soil should be really moist before the mulch is applied, and in drier areas it can be spread over the bed by early December.

Where mulching is not done the soil should be hoed frequently to maintain a surface layer of loose soil. Under this condition it is essential to hoe after each watering.

Manuring

Most rose growers give a dressing of a mixed fertiliser in late winter. This should be sufficient to maintain growth until mid summer, but additional dressings at this time will probably be required.

Unless a mulch composed of animal manure has been used, roses will benefit from the application of fertilisers high in nitrogen and phosphate in mid summer, while later in the year mainly phosphates and potash will be required. The mid summer mixture could be 2 parts of dried blood and 1 part of superphosphate applied at 2 oz a bush or 6 oz a climber, and the later dressing of 1 part of dried blood, 3 parts of superphosphate, and 1 part of sulphate of potash at the same rates. Fertilisers should be applied only when the soil is moist and should be watered in after application.

Alternatively soluble foliar fertilisers may be added to a spray mixture and applied at monthly intervals.

Disbudding

If individual flowers of hybrid tea roses are required for exhibiting or for cutting, all the small buds except the centre bud should be regularly removed when the stems are still soft. They can then be easily broken off close to the leaflets at their base, and the wound will soon heal over completely; the main bud will continue to grow with a long straight stem. It is not usually necessary to disbud a few vigorous varieties such as Queen Elizabeth, as each bloom is carried on a reasonably long stem.

Cluster-flowered types such as floribundas, polyanthas, and hybrid tea roses with single flowers are not disbudded.

Flower Gathering

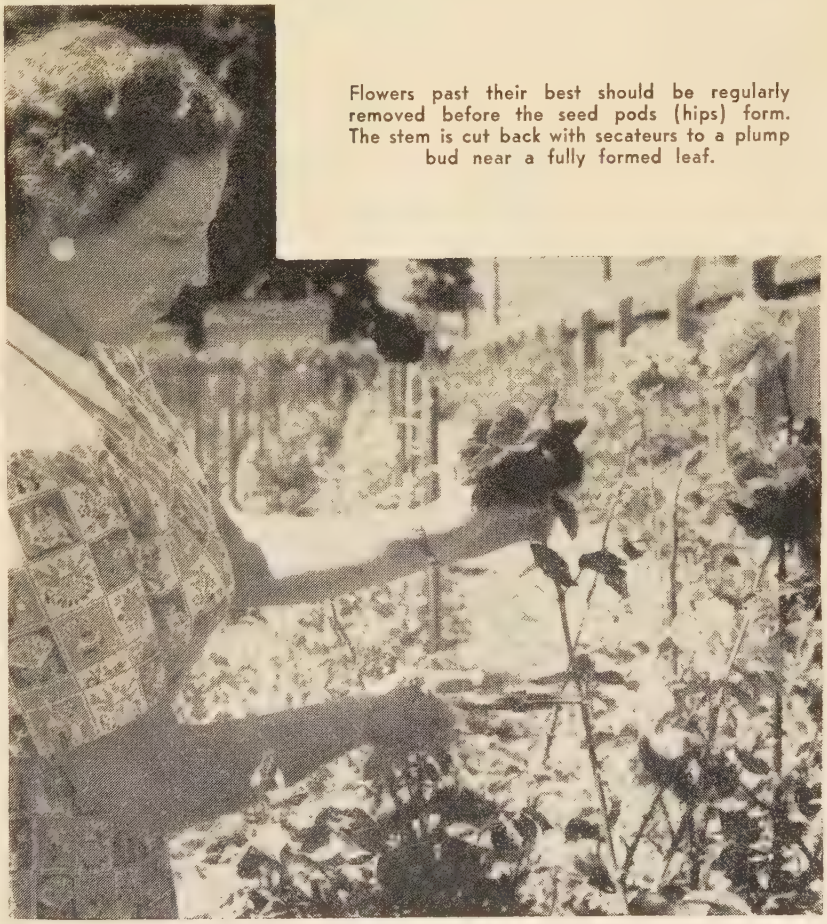
To prolong the flowering period it is essential to prevent the plants producing seed heads (hips). Flowers not gathered for use in the house should be regularly removed as soon as they are past their best.

During the early part of the season all flowers should be cut with fairly long stems, as this acts as a type of summer pruning. The stem should be cut with secateurs rather than scissors just above a plump bud in the angle of a fully formed leaf; these have five or more leaflets.

Later in the season when growth is less vigorous, flowers can be cut with shorter stems and if seed heads have already formed, these should be removed as one group, being cut back to a bud on the main shoot.

The simplest way to gather flowers is to hold the stem beneath the flower with one hand and cut the stem correctly lower down the shoot. The flower stem can then be drawn away from the plant without damage from the thorns on other shoots.

Flowers for the house are usually cut when the first two petals are un-



Flowers past their best should be regularly removed before the seed pods (hips) form. The stem is cut back with secateurs to a plump bud near a fully formed leaf.

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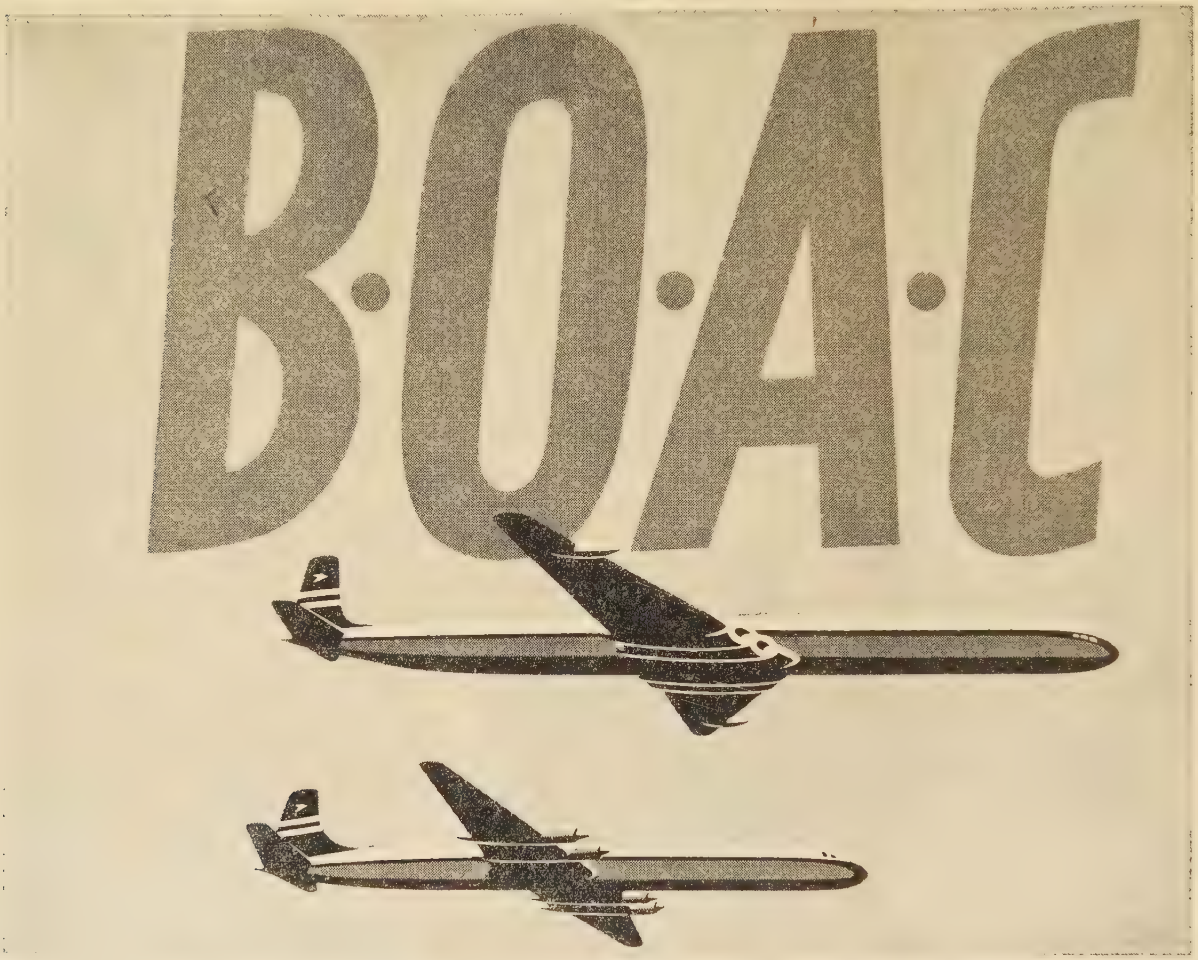

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furling. The best time to gather them is in the evening, as they can then be placed in water overnight. After cutting, the stems should be laid flat in a shallow basket with the heads in rows. They should then be taken indoors, the lower leaves and thorns should be removed, and they should be placed upright in a deep container of water. The next day before they are arranged ½ in. of the base of the stem should be cut off and any additional leaves and thorns removed. If the flower is cut in the heat of the day, it may be necessary to trim the base of the stem under water.

If a quantity of flowers are required for a special occasion, they may be stored in a cool dark basement or in a domestic refrigerator, preferably in an empty vegetable compartment. To keep them in good condition in the refrigerator they should be taken from the water, any surplus water shaken off, and then placed in a plastic bag lightly closed at the neck. No additional water is needed in the bag and the flowers should definitely not be sprayed with water before they are placed in the bag.

Alternatively shorter-stemmed flowers may be kept on the shelves of the refrigerator with the base of the stem in a shallow container of water.

When the flowers are removed from the refrigerator the stems should be trimmed again. These flowers will open quickly when placed in an arrangement in the house.

It is often an advantage when gathering cut flowers to have an additional container as well as the flower basket so that blooms past their best can be removed at the same time.

Roses for Showing

Most gardeners growing roses like to exhibit their best flowers in shows. The specialist will grow varieties for exhibition, but frequently these are not the most satisfactory for garden display.

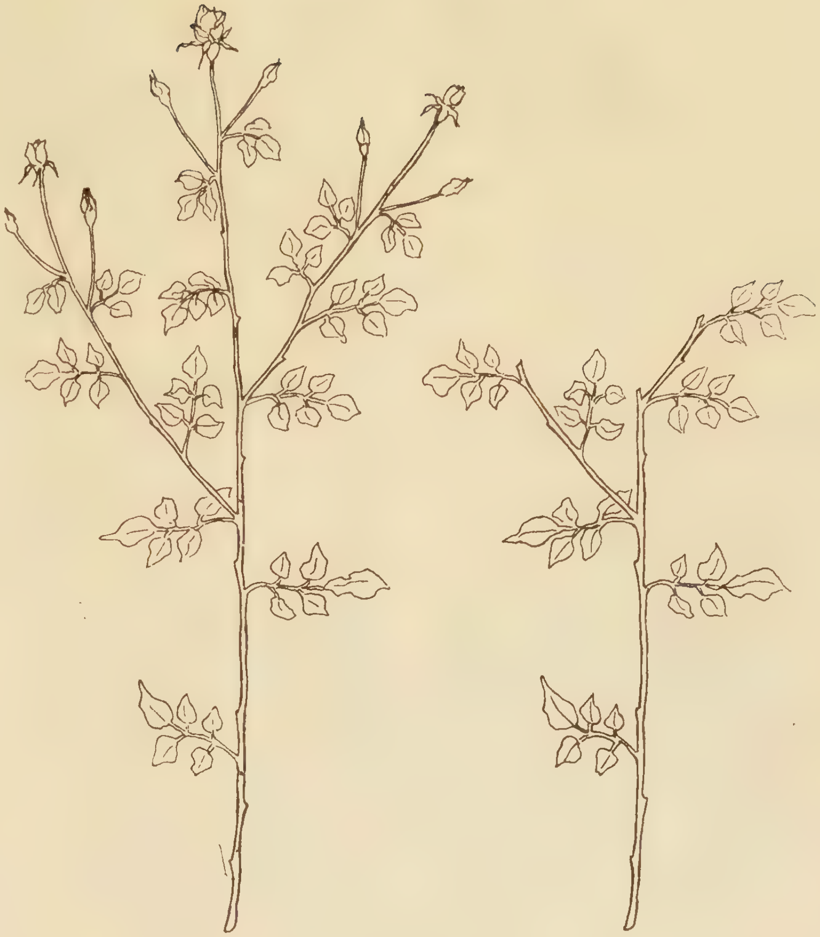
Exhibition roses are usually full-petalled large flowers which hold their shape well, while other roses, sometimes called decorative roses, are smaller, open more quickly, and usually have a somewhat flatter centre.

Roses for showing should have a good circular outline, plenty of petals, and a well formed centre. The colour should be bright and pure and the whole stem should be strong but not coarse, with clean, healthy foliage.

The flowers should be cut when the outer petals are just unfurling the evening before the show and placed in deep water in a cool, dark place.

When the exhibit is being set up the base of the stem should be cut again and the outer petals gently brushed open but not folded back to appear artificial. Preferably some foliage should be left on the stem; normally two leaves are sufficient.

SUMMER PRUNING OF ROSES



Summer pruning of a watershoot. After flowering, the centre truss of flowers is pruned off and the two side shoots shortened to well formed buds.

With floribunda and similar cluster-flowered roses the whole truss is picked and exhibited. The first flowers should not have passed their best; it is better to have a spray with the first flowers in perfect condition and the later flowers in bud.

Gardeners wishing to plant more roses can make their initial selection at a rose show, but it is advisable to confirm with the exhibitors that the varieties selected will do well in the district. A visit to a rose nursery a little later in the season will enable the gardener to see the varieties growing and to check on their habit and general growth.

Summer Pruning and Watershoots

During the whole of the season all dead shoots, stubs, or dying tips of the branches should be regualrly cut off and burnt. Regular cutting of flowers will act as a summer pruning of the healthy shoots.

If a rose is healthy, it will produce strong young growths from the base or the lower part of the older shoots; these are known as watershoots and if growing in the right direction, they will form the future framework of the plant.

As they grow extremely quickly, the watershoots in all windy areas should be lightly looped to a stake as they grow; once they have flowered they will become thicker and firmer.

Watershoots produce clusters of flowers at the top only, usually a central truss with two side trusses beneath it. These shoots should not be pruned hard, as they are soft and full of sap. Pruning consists merely of cutting out the centre truss after flowering and later trimming back the side trusses to a well formed bud. This will induce buds lower down the stem to grow out, and harder pruning is carried out in winter.

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Overseas, where roses are budded on to a different stock from the one used in New Zealand, growths known as suckers arise from the original rootstock. This seldom occurs here, where the multiflora rootstock is used, but if suckers do grow from this stock, they can be easily recognised, as the leaves are small, crinkly, and pale green, quite unlike the usual rose foliage. Suckers should be traced to their point of origin and cut away completely.

Autumn Flowering

Though roses will flower during the whole of summer and autumn, there is a recent trend in warmer areas to modify cultural methods to reduce flowering in the heat of summer and encourage flowering in autumn, especially if an autumn rose show has been arranged.

These methods involve watering, feeding, and summer trimming.

A period of partial dormancy is induced by reducing watering or omitting it during the latter half of January. In early February the rose beds should be thoroughly watered. During this period all flowers should be gathered with very short stems. After watering, a dressing of fertiliser containing nitrogen and phosphate should be applied and the plants trimmed.

The exact date on which the roses are trimmed will determine the peak of autumn flowering. Local rose growers who practise this method will be able to give the exact date for the district. This will normally be during the first or second weeks of February.

Summer trimming is a simple method of pruning in which all mature shoots are cut as though gathering flowers with a long stem. The shoot is cut back to a plump bud which has developed in the angle of a complete leaf.

Small shoots and watershoots are not cut back.

If the weather is dry, watering should be continued.

Pest and Disease Control

Unfortunately roses are susceptible to attack by a number of pests and diseases and the best results will be achieved only by regularly spraying or dusting to prevent infection or obtain immediate control.

District experience will indicate the best spray programme to adopt. When pests and diseases occur control will be ensured only by identifying the trouble, applying the correct therapeutant promptly and adequately, and by continuing to apply these materials over a period.

During the summer the materials can be applied by spraying or dusting, and many rose growers make regular applications every 10 days to a fortnight irrespective of the troubles likely to be present.

The following is a good general-purpose spray:

Captan 50 per cent wettable powder - -	1 oz
Colloidal sulphur 70 to 75 per cent wettable powder	¾ oz
Malathion 25 per cent wettable powder - -	¾ oz
Household detergent -	½ teaspoon
Water - - - -	4 gallons

A general-purpose dust can be made from:

Flowers of sulphur	5 parts by volume
Thiram or captan 50 per cent - -	2 parts by volume
Lindane 1 per cent dust - - -	3 parts by volume

Full details of rose pests and diseases and their identification and control are given in Department of Agriculture Bulletin No. 359, "Roses in the Home Garden". Local offices of the Horticulture Division of the Department provide leaflets on this subject appropriate to the area.

Work for December

Routine garden tasks should be attended to early this month if the display is to be at its best during the Christmas and holiday period.

BY ROSALIE A. CAMPION,
Horticultural Instructor,
Department of Agriculture,
Wellington

Lawns

Lawns set the tone in a garden and regular mowing will help maintain a fine, even turf. If mowing is spasmodic, the fine grasses do not receive enough light and the turf will open up and become uneven with tufty growth.

The quarterly lawn dressing of 1 oz per sq. yd. of a mixture of 1 part of superphosphate to 3 parts of sulphate of ammonia could now be applied, preferably while the dew is on the ground. Trimming of lawn edges with a sharp spade is sometimes necessary if they have become very ragged. A tight string or wire line should be used to ensure a straight cut. The cut itself should slope away from the lawn at an angle of 45 degrees to give stability to the edge.

Weed Control

Topdressing usually controls lawn weeds, but if many weeds are present, a spray of MCPA could be applied before topdressing.

In large shrubberies weed control is often a problem. It has been found experimentally that if the area is cleared of weeds now and sprayed immediately, good control of weed seedlings can be obtained for up to six months. Monuron (formerly called CMU) at 1 oz to 150 sq. yd. dissolved in water can be sprayed over the area. Care should be taken not to spray the foliage of shrubs.

On paths a mixture with water of 1 part of amitrol and 5 parts of dalapon at 1 oz to 30 sq. yd. will control a wide range of flat weeds and grasses. It can be applied at this time.

Silver Leaf Fungus

Flowering plums, cherries, peaches, and apricots, and roses, escallonia, japonica, lilac, rhododendrons, poplar, ash, and silver birch are all susceptible to attack by this fungus through wounded tissue. The symptoms are silvering of the foliage and debility of the plants. New growths should be examined now for this silvering, as especially later in the season it can be confused with damage by thrips or red spiders which suck the sap from the leaves and thus cause silvering. If new growth is silver when it develops, the plant is most probably harbouring the fungus.

This is the best time to cut out and burn infected branches and dead wood, as spores are not usually produced at this time. All wood which has stained cells inside should be cut out. If the whole plant is infected, it should be removed entirely and burnt.

Plantings

The more tender bedding plants such as zinnias, salvias, and cannas and the more hardy bedding plants can still be planted up. It is useful to have a few extra plants of nemesia, phlox, and calendula for filling in gaps as they occur throughout the season.

Autumn crocuses and other autumn-flowering bulbs can now be planted up to give interest when the mass of summer annuals is finished. Freesia seed treated as mentioned in last month's notes can now be sown in boxes or in flowering positions. Anemones planted now will be useful for picking during late winter.

Sowings

Useful plants which can be grown from seed sown thinly at this time include cinerarias, pentstemons, Brompton stocks, Iceland poppies, pansies, Russell lupins, and anchusa.

A little extra organic matter could be added to the seed sowing mixture recommended in the August issue to prevent drying out. The boxes could be placed, for germination, in a shaded position, but not under the eaves of

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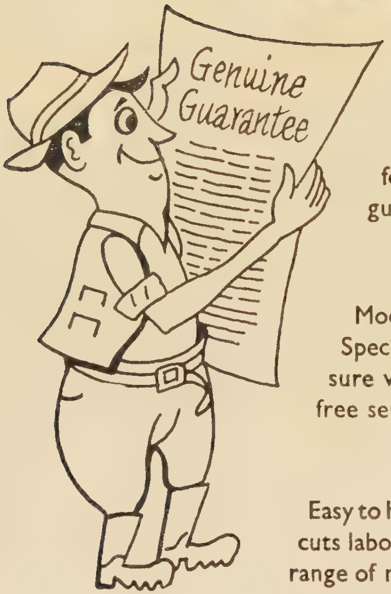

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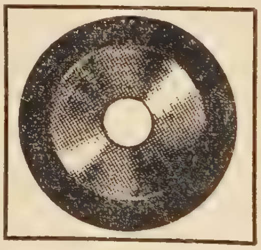

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houses or under trees where large rain splashes can do damage.

Lily of the Valley

Beds of lily of the valley which have become overcrowded and have thus not flowered so profusely could be lifted and divided now. This plant prefers partial shade and soil which is rich in organic matter to help keep the roots moist and cool in hot weather.

The soil should be well worked up before planting and a balanced garden fertiliser should be applied at 6 oz per sq. yd. This could be mixed in during the final forking. The young pips should be set 4 in. apart, with the tips just below soil level.

If the original bed is not crowded, it could be topdressed with compost and a balanced fertiliser used at 3 oz per sq. yd.

Perennial Plants

In very dry weather paeonies should be kept well watered. An application of bone meal and careful watering will build strong blossom buds for next season's flowering.

Violas and pansies should be cut back hard now to remove the exhausted flowering shoots. New growths will soon appear and will be improved by a side dressing of balanced fertiliser mixture at 1½ oz per yard of row. This will help to bring them quickly back into flowering.

The bearded iris should be lifted and divided after flowering. If rhizomes are damaged or diseased, they should be cut back into healthy tissue and the end could be dusted with flowers of sulphur. The rhizomes should be nestled into the top of the soil so that the roots are well anchored but with the rhizome above ground level.

Feeding Plants

Most plants will benefit from side dressings of a balanced fertiliser, especially if their roots are in a poor soil or lack organic matter. In good soils a balanced fertiliser dressing given at planting or in early spring will generally be sufficient.

Soluble fertilisers are available, but it is more economical to apply a good balanced dressing early in the season and only follow up if necessary with side dressings during the growing season. A balanced fertiliser can be made by mixing:

3 parts of blood and bone
2 parts of superphosphate
1 part of sulphate of potash

Plants from Cuttings

During the next three months a wide range of plants can be propagated from soft and half-ripe cuttings. So wide is the range that it is usually worth while to try any desired plant by taking a cutting of this season's growth. Alyssum, aubrietia, fuchsias, sweet williams, arabis, violas, pansies, and geraniums will all root readily from soft cuttings, which should be kept under humid conditions until they root.

Pansies are useful spring bedding plants which can be revitalised by cutting back and topdressing in December.

Methods of preventing moisture loss from the leaves include covering with a preserving jar, placing in a closed frame or glass-covered box, or the use of polythene plastic. The plastic allows air to pass through but does not allow the passage of moisture. If cuttings are placed in a pot of sand and the whole pot is enclosed in a closed polythene bag, the cuttings can breathe, but the moisture does not escape while they are rooting. Fuchsias, hydrangeas, coleus, and many shrubby plants can be propagated in this way and many perennials root easily without this extra care.

The taking of cacti and succulent cuttings should be concluded this month.

Bulbs

Iris bulbs should be dipped or dusted with lindane before storing to prevent a carry-over of aphids which spread the iris mosaic virus. Bulbs from iris which have been attacked by rust fungus should be lifted and stored

Coleus plants, which are grown in a greenhouse and often used as house plants, can be grown from cuttings taken in December. Rooted plants should be potted into larger pots as required.

In the Glasshouse

Some shading will be necessary in most glasshouses to prevent burning and help keep the temperatures between 60 and 75 degrees F. A suitable mixture for spraying on to the glass is 2 lb of hydrated lime, 3 tablespoons of household detergent, and 2½ gallons of water.

Free circulation of air is important, as many fungous diseases thrive in high humidity and stagnant air.

Plants should not be allowed to dry out and individual pots should be checked daily for moisture content. Dry pots will have a hollow ring when tapped.

Quickly growing plants such as cinerarias, begonias, and coleus should be potted on into larger pots as soon as the roots show through the sides of the soil ball. A potting mixture suitable for most plants is made using 7 parts of good loam, 3 parts of leaf mould, compost, etc., and 2 parts of sharp sand plus 4 oz of the balanced fertiliser (see page 495) and ¾ oz of lime per bushel (apple case) of mixture. This is the mixture used for pricking out seedlings; for pot plants the amount of balanced fertiliser can be increased up to three times this amount.

Poinsettias can now be cut back hard for winter flowering. Cuttings of young shoots can be rooted in a closed frame. The base of the cuttings, which exudes a milky substance, could be dipped in charcoal before it is inserted in sand to root.

Pelargoniums which have finished flowering should now be stood outside in a sunny place to ripen the wood for taking cuttings later.

Begonias will need constant care now if they are to give a worth-while display. The secondary side flower buds should be removed to allow the central flower to develop properly. Faded flowers and seed pods should be removed and liquid feeding is desirable.

Chrysanthemums for flowering in pots should be given their final potting this month and should be nipped back once more.

Thrips are sometimes a problem on chrysanthemums, carnations, and orchids. DDT sprays or smokes could be used for control. Aphids are a problem on many plants and fumigation with lindane or malathion aerosols at 5 seconds per 500 cu. ft. of house, or sprays of lindane, malathion, or nicotine sulphate, could be used. Red spider on carnations, vines, and orchids is another problem. Two azobenzene smokes at a 10-day interval or sprays of malathion at 7-day intervals should give control.

Abutilon striatum (A. thompsoni) being grown in a glasshouse. Each plant should be watered individually as required, the spout of the watering can being placed on the edge of the pot so that no water will be spilt.

until planting time under dry conditions. The rust spores which spread the disease have only a short life under dry conditions and a clean crop can eventuate from such bulbs. It is important, however, not to replant into the same ground, as the rust spores may still be alive on pieces of plant leaves left from the previous season.

Tulip bulbs should be lifted annually in warmer climates, but under cool conditions and deep planting need only be lifted every two to three years. Narcissi bulbs should be treated with aldrin when lifted to prevent damage from bulb flies.

Pest Control

The caterpillar of kowhai moth, leafroller caterpillar, looper caterpillar, cherry slug, and any other pests which eat large holes in leaves can be controlled with sprays of arsenate of lead, malathion, or lindane.

Mealy bugs on fuchsias, cottony cushion scale on hydrangeas, scales on roses and shrubs, and thrips on a wide range of plants from roses to rhododendrons can be controlled with sprays of summer oil or malathion emulsion. On roses, however, emulsion forms of therapeutants should be used at the lowest recommended strengths.

Red spider mites make many plants including cantua, violets, and carnations look very sickly in dry conditions. They suck the sap from the plants and cover themselves with a fine webbing underneath the leaf. Keeping conditions moist and spraying with malathion will prevent a build-up of the pest.

Where insect populations in the soil are high aldrin or nicotine sulphate plus soft soap should be watered into the soil round the plants.

General

All autumn-flowering chrysanthemums should be stopped again in the early part of this month.

Flowering brooms, kerria, philadelphus (mock orange blossom), and similarly flowering shrubs could be pruned immediately after flowering.

Layering of plants could be done now. Aerial layering with polythene plastic and sphagnum moss is a method worth trying.

Compost heaps should be in constant use now, but large amounts of lawn clippngs should be broken up with other materials to prevent them becoming soggy. Sawdust is suitable. If flies are troublesome, the heap should be covered with soil or sawdust and dusted with DDT.

Carnations can be cut back after flowering and cuttings of dianthus (pinks) can now be rooted.

Roses will benefit from an organic mulch as well as regular spraying.

Wallflower plants can now be lined out to develop for setting out in autumn.

Jams, Jellies, and Conserves

THE making of jams and jellies is not really difficult and the sight of rows of gleaming jars of these preserves made from fresh fruit picked at just the right stage to retain the maximum amount of flavour is ample repayment for the trouble taken.

THE equipment needed is simple and inexpensive. A large kettle or preserving pan is necessary. A good type to use is a heavy cast aluminium pan with a flat, broad base and fairly shallow. This shape allows the jam to come to a full rolling boil without danger of boiling over the sides.

Other requirements are a pair of kitchen scales, a wooden spoon, a colander, a wooden board, and sharp knives.

For jellies a large, muslin jelly bag is also necessary and a sugar thermometer, though not an absolute necessity, can be a great help.

Any type of glass jar is suitable for jam provided that the top is wide enough for the jam to be removed with a spoon. Straight-sided glass jars are best for jellies or, if the sides slope slightly, the diameter at the top must be wider than at the base. Small jars are best so that the jelly can be tipped right out.

Basic Ingredients for Jams

The **fruit** is the base and provides the characteristic flavour. Most fruits also contain **pectin** and **acid** in varying proportions. These two ingredients have to be present in the correct proportion to ensure a satisfactory jell. Different fruits contain varying amounts and the maturity of the fruit when picked also affects the amount of pectin present. Below is listed the pectin and acid content of fruits. If fruit with a low pectin content is used, a jell can be obtained either by mixing in other fruit with a high pectin content or by using home-made or commercial pectin extracts. Should the fruit be low in acid, this is easily remedied by the addition of lemon juice or citric or tartaric acid.

By ELEANOR S. CAMPBELL,
formerly Home Science Instructor,
Department of Agriculture,
Auckland

Sugar helps in the jell formation and also inhibits mould and bacterial growth and therefore helps to preserve the fruit and adds to the flavour. Honey may be used to replace part of the sugar. The amount of **water** used, if any, depends on the type of fruit.

Fruits Rich in Pectin and Acid

Apples, especially sour apples
Cranberries
Red and black currants
Gooseberries
Loganberries
Green grapes
Guavas
Grapefruit
Lemons
Blackberries, slightly unripe
Raspberries

Fruits Rich in Pectin, but not Acid

Some kinds of apples
Quinces

Fruits Poor in Pectin

Ripe apricots
Cherries
Pineapples
Strawberries

Fruits Poor in Both Pectin and Acid

Elderberries
Peaches
Pears

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—P.B.A.

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Testing Fruit for Pectin

Cook the fruit until soft, put a teaspoonful of the fruit pulp or juice into a cup, and allow to cool. Add one tablespoonful of methylated spirit. Pour the mixture into another cup or on to a saucer. If a large clot forms, there is plenty of pectin. If only small, weak clots form, pectin is lacking.

Rules for Jam Making

1. Choose only sound, fresh fruit. **Note:** Some fruits contain more pectin if slightly underripe, but a better flavour is obtained if fully mature fruit is used. A judicious mixture of the two is often satisfactory.

2. Measure quantities correctly. Measure or weigh the fruit after it has been prepared, that is, washed, cut, if necessary, and all stems, leaves, and other unwanted pieces removed. Weigh out the correct amount of sugar. Measure the right quantity of water according to the recipe.

3. Do not try to make too large a quantity at a time, especially when making jelly.

4. Have all equipment clean and ready to use. Jars must be absolutely clean, washed and rinsed in hot water, allowed to drain, and then placed in a warm oven until the jam is ready. They will then be clean and warm when the hot jam is poured into them and should not crack.

5. When the sugar has been added and dissolved, boil the jam as quickly as possible until it is ready to set.

6. Fill the jars, cover, wipe clean, and allow to cool before labelling.

7. Store in a cool, dry place.

Sealing the Jars

There are various ways of sealing jam and jelly jars. Some housewives make a very successful job simply by using rounds of greaseproof paper on top of the jam and then pasting paper over the top. However, transparent covers are available commercially in neat packets with rubber bands and labels. These are not expensive and are very easy to apply. Paraffin wax also makes an excellent airtight seal and is especially suitable for jellies.

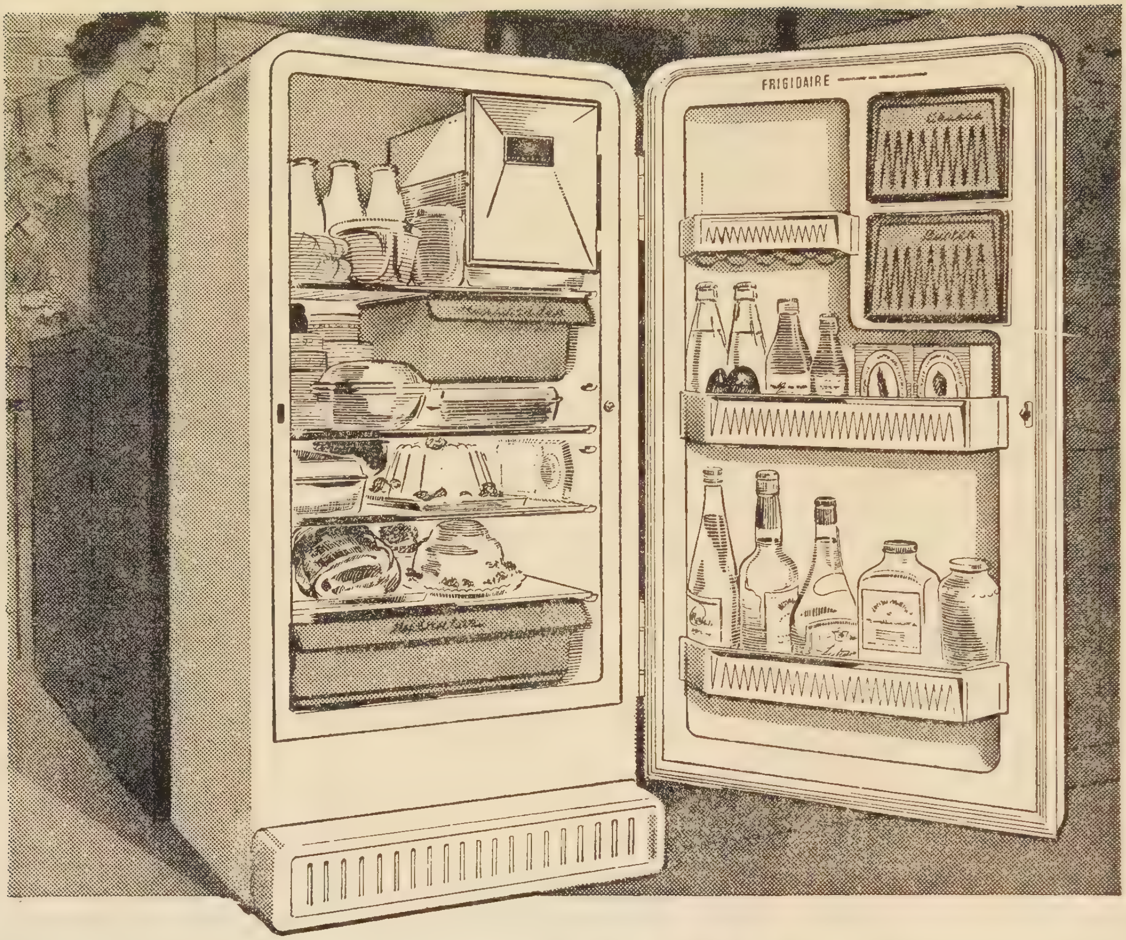
Sealing Jars with Wax

Hot method: Melt the wax carefully in a bowl or jug over hot water. Keep away from flame. Fill the jar with hot jam to within about an eighth of an inch of the rim. Carefully pour a little melted wax straight on top of the jam and turn the jar so that it forms a complete seal. Allow this wax to set hard and then pour another layer of melted wax on top of the first.

Cold method: Fill the jars with jam, cut a round of greaseproof paper to fit the top of the jar, and cover the jam with this. When the jam is cold and set pour the melted wax on top,

Jam should boil fast after the sugar has been dissolved.

▼ Applying wax as a seal for jam. The jar should be turned so that the wax forms a complete seal.



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turning the jar carefully so that all crevices are filled. Leave a layer of wax not less than an eighth of an inch thick to form the seal. For jellies fill the jars almost to the brim with hot jelly. Allow to cool. When cold and set it will have shrunk sufficiently to allow for a layer of wax. Pour the hot, melted wax directly on to the jelly, turning the jar to ensure complete coverage.

Basic Recipe for Jam

The usual ingredients are 1 lb of prepared fruit to 1 lb of white sugar. The amount of sugar, as with water, will vary with the fruit. Fruits rich in pectin and acid will take more sugar, that is, up to 1¼ lb of sugar per pound of fruit. Those fairly rich in pectin will take pound per pound, and for fruits poor in pectin use only ¾ lb of sugar per pound of fruit. The amount of water varies according to the juiciness of the fruit.

Method: Prepare the fruit and weigh it. Measure the water, if necessary, and add to the fruit in the preserving pan. Add the acid and cook the fruit gently until it is soft and tender.

When the fruit is cooked add the sugar (this can be warmed in the oven while the fruit is cooking). Stir until the sugar is completely dissolved.

Boil briskly for a short time until the jam is ready to set. Cool the jam slightly, then pour into clean jars, wipe, and cover.

Testing for Setting Point

The easiest and most satisfactory way is to use a sugar thermometer. Warm the thermometer by putting it in hot water before plunging it into the boiling jam. The setting point is reached between 220 degrees and 222 degrees F.

Household Tests

Put a little jam in a saucer and leave it to cool. Take the pan off the heat while doing this test, as, if the setting point has been reached, the jam will overcook while the test piece is cooling. It is at the right stage if the jam on the saucer wrinkles or forms a skin when a finger is lightly drawn across it.

Sheet or Flake Method

Put a cold metal spoon into the jam and, lifting it above the pan, gently tip it up. If the drops run together and fall off in a sheet, the setting point has been reached.

Rules for Jelly Making

The notes on equipment and preparation of fruit apply as much for jelly making as for jam. With jelly, however, it is more important to cook only small quantities at a time. Also it is very important to have the correct amount of pectin and acid. If it is desired to make jelly from fruits low in pectin such as peaches, then the addition of home-made or commercial pectin is advised, or some fruit high in pectin content such as apples should be mixed in.

Making Jelly

Prepare the fruit by washing it under running water. A colander is useful for this, as the fruit can be well washed and still not be left soaking in water. All stalks and leaves are removed, but not the skins or cores. Large fruits such as apples and quinces may be quartered or cut into smaller pieces, but skins and cores are left.

Put the fruit into the pan and add water, according to the recipe given. Cook until the fruit is soft and pulpy. Cooking too long destroys the pectin.

Strain by placing the pulped fruit and juice in a jelly bag or a large square of cheese cloth, tie the top, and allow it to hang so that the juice will drip through into a container. Leave it hanging overnight until all the juice has dripped through. If the bag is twisted or squeezed to get all the juice possible from the first extraction, the juice must be strained again through a double thickness of cheese cloth.

Testing for pectin is not always necessary, but it may be a help to apply the pectin test to the juice before making the jelly.

Measure the juice and weigh out the sugar required. Heat the juice and as soon as it boils, add the sugar, and boil briskly until it is ready to set. Remove the scum and pour the jelly into clean, pre-heated jars. Cover as for jam, cool, and store in a dry, airy place.

Conserves

Fruit conserves, or whole-fruit jams, are the same as jam except that the fruit is left whole in the case of small fruits like strawberries or in pieces of uniform size and shape if larger fruit is used. In jams the fruit is generally pulpy or has to some extent lost its shape, and consistency should be reasonably smooth and uniform throughout. With conserves, however, the fruit becomes translucent as it is cooked, retains its shape, and is surrounded by clear thickish syrup.

RECIPES

Jams

Plum Jam (Recipe 1)

4 lb of plums
Approximately ½ pint of water
4 lb of sugar

If plums are large, wash and stone them. If small, wash them, add water, and simmer gently until the fruit is soft. Skim off any stones which float to the top. Add sugar, stir until dissolved, then boil hard until setting point is reached, usually about 20 to 30 minutes.

Plum Jam (Recipe 2)

(Suitable for greengages, yellow gages, or damsons.) Allow ¾ lb of sugar to each pound of fruit.

Wash and split the plums and remove the stones. Place the fruit in a large bowl and cover with half of the sugar. Leave to stand overnight. Then put the fruit and sugar into a preserving pan and bring slowly to the boil. Simmer until plums are tender. Add the rest of the sugar and boil rapidly until a set is reached (20 to 30 minutes).

Raspberry Jam

4 lb of raspberries
3 lb of sugar

Wash the fruit and place it in the preserving pan. No water need be added. Heat gently until the juice comes out of the fruit. Bring to the boil and simmer until the fruit is tender. Add the sugar, stir until dissolved, and boil rapidly until setting point is reached (approximately 15 minutes).

Peach, Apple, and Ginger Jam

2 lb of ripe peaches
1 tablespoon of lemon juice
2 oz of crystallised ginger
2 lb of sour apples
3 lb of sugar

Wash the peaches and cut into pieces, removing skins and stones. Wash, peel, and core apples. Tie the peel and cores in a small piece of muslin. Quarter the apples. Put all the fruit and the bag of peel and cores into a preserving pan, add a little water, and bring gently to the boil. Simmer until tender. Remove the bag of peel and cores. Add lemon juice and sugar and chopped crystallised ginger. Boil fast until a set is obtained.

Dried Apricot Jam

2½ lb of sugar
1 lb of dried apricots
3 pints of water

Wash the fruit well, add hot water, and soak for 24 hours. Boil until the fruit is clear and soft. Add sugar, stir until dissolved, then boil fast until jam will set. The addition of 2 oz of blanched, chopped almonds improves the flavour.

Jellies

Home-made Pectin Stock

Suitable fruits to use are apples or red or black currants. Use 2 pints of water to 6 lb of fruit.

Wash the fruit, cut apples, but do not peel or core. Put in pan, add water, and stew gently until fruit is soft. Mash well. Strain through a jelly bag. Bring the juice to the boil and store in sterilised jars.

Grape Jelly

Wash and stem the grapes, place in the preserving pan, but do not add water. Heat slowly until the juice starts to flow. Turn up the heat until the juice flows freely. Place the juice and fruit in a jelly bag and leave to drip. Measure the juice and add an equal quantity of sugar. Stir until dissolved then boil rapidly until a set is obtained. Start testing for a set after 10 to 15 minutes, and test each 5 minutes afterward. Take jelly off the heat while testing. Remove the scum and pour into warm, sterilised jars.

Quince Jelly

4 lb of quinces
Lemon juice
¾ cup of sugar to each cup of juice
Water to cover fruit

About a quarter of the quinces should be underripe and the rest of them mature. Wash, and remove the stems from the quinces but do not peel or core. Cut the fruit into small pieces, put it in the pan and barely cover with water. Simmer approximately half an hour or until the fruit is soft. Strain through a jelly bag overnight. Measure the juice, add 1 tablespoonful of lemon juice per cup of juice, and ¾ cup of sugar per cup of juice. Put all into a pan and bring to the boil, stirring until the sugar is dissolved. Boil quickly until a set is obtained. Remove the scum and pour into jars.

Mint Jelly

This makes a change from mint sauce and is a pleasant accompaniment for lamb or mutton, either hot or cold.

2 lb of cooking apples
Large bunch of mint
Water to cover apples
Green colouring
1 lb of sugar to each pint of juice
¼ pint of white vinegar or ¼ pint of lemon juice

Wash and cut up the apples, but do not peel or core. Put them in the pan and barely cover with water, simmer gently until the fruit is quite soft. Strain through a jelly bag. Measure the juice and put it in a preserving pan with the vinegar or lemon juice. Bruise and chop up washed mint leaves and stalks and add to juice. Bring slowly to the boil. Strain again, bring the liquid to the boil, add warmed sugar and **boil briskly** for 4 to 5 minutes until a set is obtained. Add a few drops of green colouring, put in warm, sterilised jars, and cover when cool.

Conserves or Whole-fruit Jams

Strawberry Conserve

2 lb of strawberries
2 cups of sugar
2 tablespoons of lemon juice

Use only perfect, ripe, well coloured fruit. Wash them thoroughly, hull, and leave whole. Place the berries in a pan and sift over them ½ cup of sugar. Add the lemon juice and stand overnight. Next day add the rest of the sugar, heat gently until sugar has dissolved, then heat to boiling and boil rapidly for 7 minutes. Pour into hot, sterilised jars and seal.

Cherry Conserve

2 lb of cherries
1 tablespoon of lemon juice
3 cups of sugar

Choose well ripened, firm fruit. Leave the stems on. Wash the fruit well, drain, pit to remove stones, leaving cherries as whole as possible. Put fruit into a preserving pan, stir in the sugar, cover, and leave until the sugar is dissolved. Put over a low heat and bring gently to boiling point. Add the lemon juice and boil rapidly approximately 15 minutes until the fruit is clear and the syrup thick. Cover and leave overnight, when the fruit will absorb some of the syrup. Pack in hot, sterilised jars and seal as usual.

All photographs by Sparrow.

The Pros and Cons of Spinach

POP-EYE has gone and with him many of the extravagant claims which were made concerning the virtues of spinach. Some will regret that this gruff old fellow has faded from the scene, but others who dislike this vegetable may be somewhat relieved. His contention was that no little boy would grow into a big, strong man unless he ate his spinach, and many small boys struggled manfully to eat up their quota in the belief that it would have some magical effect.

Probably no vegetable has caused more controversy than spinach and the other leafy greens such as silver beet, chard, and New Zealand spinach. In the earlier days of nutrition research these greens were found to contain appreciable amounts of calcium with some iron and other valuable minerals and vitamins. Because of this they were given to babies in the form of puree, and conscientious mothers continued to regard them as an important part of their children's diet.

Later the results of numerous experiments on rats showed that because of the high proportion of oxalic acid which these vegetables contained the calcium was utilised very poorly if at all. It was even thought that the oxalate present might render unavailable the calcium from other important foods such as milk. This was the first blow to Pop-eye.

The amount of oxalic acid varies with different varieties, silver beet containing less than spinach and New Zealand spinach. Though the reactions which take place in the body may not be the same as test-tube experiments, in theory it would take 5 oz. of milk to neutralise the excess oxalate in an average serving (100 grammes) of silver beet and 8 to 9 oz. of milk to neutralise a similar serving of New Zealand spinach. However, if children have their full quota of milk, they obtain far more calcium than the small amount neutralised by the oxalates in spinach.

In 1948 Professor H. C. Sherman, a world authority on nutrition, issued the following statement: "Let us make frank and full confession that spinach was a mistaken choice as a green to be especially recommended and let us now promote broccoli, cabbage, kale, loose leaf lettuce, mustard greens, turnip greens, or water-cress"—a second blow to Pop-eye.

However, it is also argued that as the few balance studies carried out on humans do not show evidence of any significant effects of calcium unavailability if greens such as spinach, silver beet, chard, and New Zealand spinach are eaten in normal amounts, they should not be condemned.

We may conclude that as in feeding the family we do not depend on silver beet or spinach for our supplies of calcium, there is no reason why they should not be included in moderation in our diet to provide variety. They are easy to grow and they supply some iron, vitamin C, and carotene, but they can no longer be recommended as a good source of calcium. If a child likes spinach, let him eat it. If he dislikes it, there is no good reason to make an issue of it; rather make sure he gets some other vegetable or fruit during the day.

—*ELEANOR COUSTON,*
Home Science Instructor,
Department of Agriculture,
Christchurch

Attractive Summer Blouse

THE attractive summer or evening blouse illustrated can be made from a yard of 36 in. material and is suitable for a young girl or matron. Directions for making it are given below.

MATERIALS: 1 yd of suitable 36 in. material; 1 1/6 yd of matching bias binding, edging, or embroidery silk for neck edge; one 10 in. slide fastener. Measurements: Bust 36 in.; waist 26 to 28 in.

Half-inch turnings are allowed. To facilitate cutting out, mark out a sheet of paper with 1 in. squares, copy the diagrams on to it, and cut out. This gives the paper pattern.

Directions for Making

1. Cut out pieces, as in the diagram below (each square represents 1 in.). If neck edge is to be scalloped, cut out pieces A, E, F, and G allowing an inch extra on top edges (as indicated on diagram by dotted lines). Turn this back, then, using edge of coin, mark design to be embroidered and embroider through double thickness. Cut surplus material away carefully. Press with damp cloth.

Make up front of blouse as follows:

2. Join pieces E, F, and G at mitred corners to make square neck piece. Press open corner seams on wrong side.

3. Join the top edge of piece B with lower edge of square neck piece (piece E). Press seams upward on inside and cut away surplus material at corners. Now there is one centre panel and two side panels.

4. Join three panels and press seams open on inside. Scallop back neck edge as front.

5. Join shoulder seams. Sew darts.

6. Join left side seam and right side seam as far as x—x leaving section below open for slide fastener.

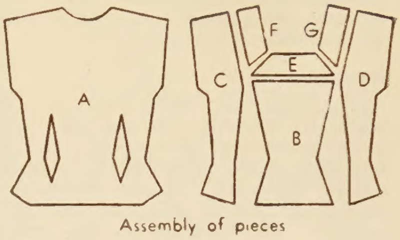
7. Sew very narrow hem round armholes.

8. Bind bottom edge of blouse with bias binding.

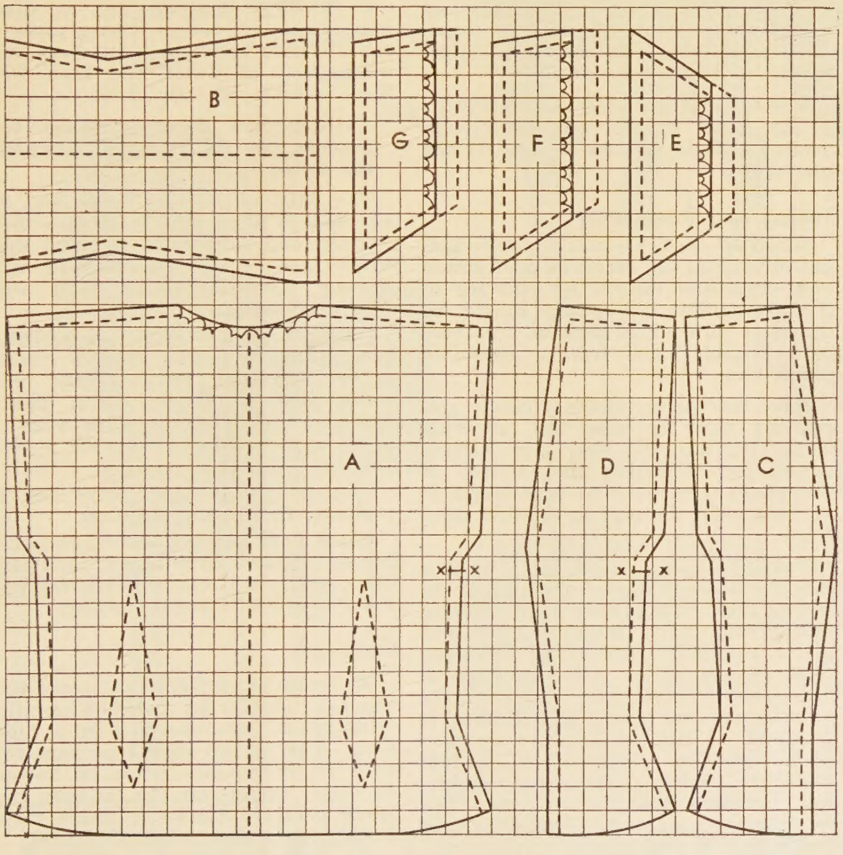
9. Sew slide fastener in place.

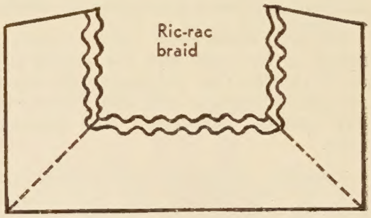
Any decoration can be used for neck edge in place of scalloping (bought edging or braid) or it can be left plain. The plain neckline is the most effective.

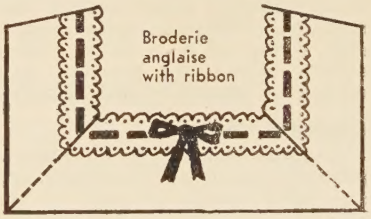
The background of wattle was photographed by Douglas Elliott.

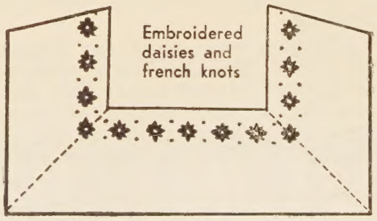


Assembly of pieces








Embroidered daisies and french knots

Above—How to cut out the pieces. Each square on the diagram represents 1 in.
Right—Alternative suggestions for finishing the neck.

As a Delicate Instrument

A Piano Needs Regular Care

MANY pianos are neglected. Is yours one of them? A piano is a beautiful piece of craftsmanship, a delicate instrument, and a valuable piece of furniture. It should receive the necessary care to ensure that it is able to give the lifetime of good service and pleasure that you expect from it.

By JANET W. ROBERTS,
Home Science Instructor,
Department of Agriculture,
Auckland

IF possible a piano should be placed against an inside wall of a living room where the atmosphere is constantly warm.

Major Enemies

Dampness, excessive heat, and draught all have a detrimental effect on a piano.

Dampness

Dampness can soon ruin a good piano by causing rust on the many metal parts and by making the felt bushings in the action parts swell and absorb moisture. Rusty strings will ultimately break and are costly to replace. The tone of the bass strings is impaired when they are rusty. Felt bushings swollen through dampness are responsible for sluggish movement as well as for keys sticking down.

Severe dampness may injure the finish of the case and the tuning plank, as it makes the glue used in the construction become soft and lose its binding power. However, this damage is rare.

Usually covers or any internal heating for the piano are not necessary but in extremely damp situations special electric piano heaters can be installed. Pianos in halls, schools, or club rooms need a fitting, felt-lined canvas cover to prevent damage caused by dampness and draughts.

Excessive Heat

A piano should not be placed too near a fire, central heating pipes, or any other source of heat. It should also be kept out of direct sunlight.

Draughts

Draughts may affect the tuning of the piano. The metal strings are made of copper and steel and so they expand and contract with changes of temperature. The temperature of the room should therefore be kept as even as possible. Do not have the piano between an open window and an open door where sudden draughts could affect it. Keep it away from windows which are frequently opened.

Borer

There is a risk of pianos being attacked by borer. They should be thoroughly inspected regularly. At the first sign of borer the piano should be treated by experts. Fumigation, carried out under a plastic cover, can be done quite safely in the home and is guaranteed effective for five years. This treatment is also effective against moths in the piano felts.

If borer is attended to before it gains a big hold, it can be successfully treated and no damage is done to the piano.

Tuning and Regulating

Whether used or not a piano gets out of tune as the result of contraction and expansion caused by changes in the atmosphere. A piano should be tuned at nine to 12 months' intervals by a reliable tuner from a reputable piano firm.

Have the vacuum cleaner handy and ask the tuner to clean out any dust while he has the top and bottom panels off. Cleaning the interior of the piano from time to time helps to prevent moth damage to the fine wool felts.

Tuning does not affect the tone of a piano. It simply puts the strings in unison and at the proper pitch. Beside tuning the piano requires tone and action regulating and other servicing from time to time. Ask the tuner to report any irregularities. Some simple adjustments are probably all that is required. A sticking key or a squeaky pedal can be rectified in a few moments. Occasionally action regulating is also desirable so that the mechanism may be smooth and responsive to the touch.

Piano tone tends to become more brilliant with use, because of the constant pounding of the hammer felts against the steel strings. As the felt becomes hard through this pounding the tone becomes more brilliant. Toning will restore the mellowness, provided there is sufficient hammer felt left. The felts usually need to be replaced every 15 to 20 years.

Piano Keys

Piano keys are usually made of a plastic or celluloid composition. Until about 25 years ago they were made of ivory.

Ivory keys have been specially treated and bleached to make them white, but they will turn yellow if continuously kept from the light so the lid over the keys should always be up. This also allows air to circulate through the felt bushings under the keys.

If the keys become dusty or dirty, wipe them lengthwise with a piece of damp cheesecloth which has been well wrung out of water and then wipe them with a soft, dry cloth.

Great care must be taken to prevent any liquid going between the keys.

The only satisfactory treatment for discoloured ivory keys is to have them scraped and buffed by a piano firm. After many years ivory keys may become semi-transparent and then they need to be re-covered.

Plastic keys will retain their whiteness indefinitely. To remove surface grime rub the keys lightly with cheesecloth which has been lightly dampened with an abrasive such as metal polish. Rub it off with a piece of clean, dry cheesecloth.

Chipped or damaged keys can be replaced for a few shillings.

Black keys can be cleaned and their colour renewed by rubbing them carefully with a soft cloth moistened with a few drops of furniture polish.

Casework

To retain the finish of the woodwork the case should be polished monthly with polish recommended by a piano firm. The top lid should be kept shut with no ornaments, vases or flowers, or other objects on top, as they may leave pressure marks or cause vibrations and spoil the tone.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—10567

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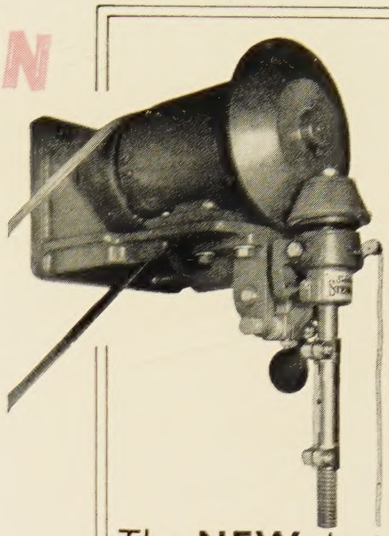

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ELECTRIC SHEARING GEAR

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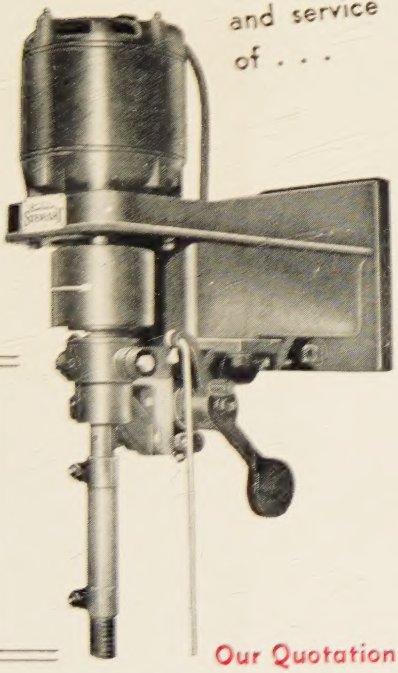


The **NEW** design **VERTICAL MODEL** is the result of long and careful research, study and improvement wherever possible of the previous type. It has been precision-built—tested—pulled down and again tested. These tests, over a long period (much more severe than normal use), have seen it come out with flying colours. The new vertical gear is the answer to electric shearing efficiency, reliability and long service.

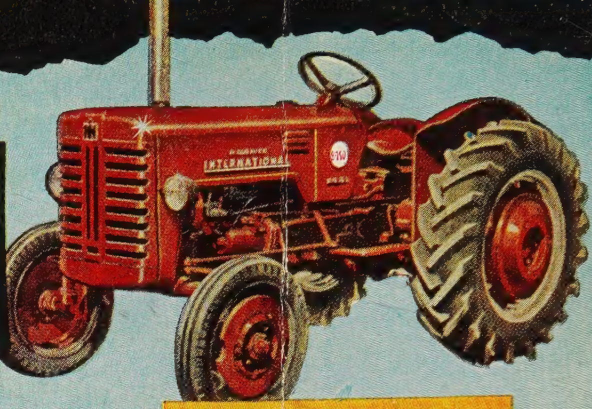
The famous EB HANDPIECE is standard equipment with SUNBEAM STEWART SHEARING GEAR.

Our Quotation will prove that . . . Sunbeam Stewart Quality Costs No More

Available from all branches and agents of the sole New Zealand distributors:

WRIGHT STEPHENSON & CO. LIMITED

LOOK NO FURTHER FOR THE POWER YOU NEED



The new
McCormick International
B-275
35 H.P. DIESEL TRACTOR
with EIGHT FORWARD SPEEDS
and TWO REVERSE
plus
CONSTANT-RUNNING P.T.O.

The outstanding
McCormick International
B-250
30 H.P. DIESEL TRACTOR
DIFFERENTIAL LOCK
DISC BRAKES

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The New Farmall
B-450
55 H.P. DIESEL TRACTOR
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BIG POWER WITH
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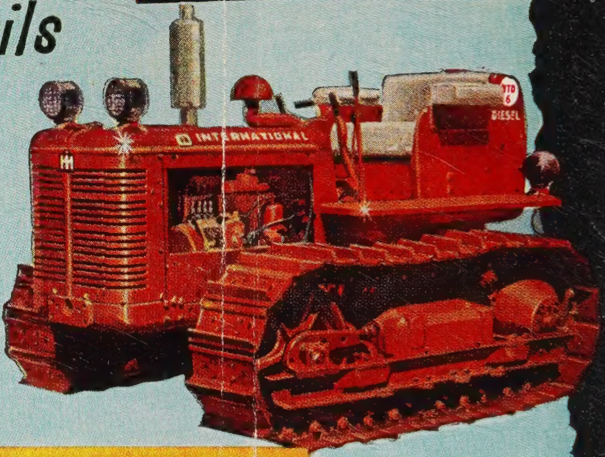

The International
BTD-6
50 H.P. CRAWLER TRACTOR

IH® POWER COVERS THE FIELD OF FARM MECHANISATION

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